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OCEANOGRAPHIC DATA COLLECTED FROM THE *HENRY LARSEN* IN THE BEAUFORT SEA, SEPTEMBER 1991.

by

R.W. Macdonald, D. Sieberg, R. Pearson, D. Paton, M.C. O'Brien, F.A. McLaughlin, E.C. Carmack

Institute of Ocean Sciences
Department of Fisheries and Oceans
Sidney, B.C.

1992

CANADIAN DATA REPORT OF HYDROGRAPHY AND OCEAN SCIENCES NO. 112

Canadian Data Report Of Hydrography and Ocean Sciences

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Abstract

R.W. Macdonald, D. Sieberg, R. Pearson, D. Paton, M. C. O'Brien, F.A. McLaughlin, E.C. Carmack, 1992, Oceanographic Data Collected from the *Henry Larsen* in the Beaufort Sea, September 1991. *Can. Data Rep. Hydrogr. Ocean Sci.:* **112**, 108 pp

A cruise to the Southern Beaufort Sea was carried out from the *Henry Larsen* September, 1991. Here we report the bottle data for measurements of salinity, temperature, nutrients (silicate, phosphate and nitrate), dissolved oxygen and chlorophyll *a* determinations, and the CTD data.

Key words: Arctic, Canada Basin, chlorophyll a, coastal zone, nutrients, oceanography, oxygen, salinity, temperature.

Résumé

R.W. Macdonald, D. Sieberg, R. Pearson, D. Paton, M.C. O'Brien, F.A. McLaughlin, E.C. Carmack, 1992, Oceanographic Data Collected from the *Henry Larsen* in the Beaufort Sea, September 1991. *Can. Data Rep. Hydrogr. Ocean Sci.:* **112**, 108 pp

Une mission a été conduite dans la partie sud de la mer de Beaufort à bord du *Henry Larsen* en août-septembre 1991. Dans le présent document, nous rapportons les données de salinité, température, nutriments (silicate, phosphate et nitrate), oxygène dissous et chlorophylle *a* qui ont été obtenues suite à cette mission, ainsi que les données CTP.

Mots-clés: Artique, Bassin Canada, chlorophylle *a*, zone côtières, nutriments, océanographie, oxygène, salinité, température.

Acknowledgements

We are very much indebted to the officers and men of the Canadian Coast Guard Ship *Henry Larsen*. We especially note the assistance of Capt. S.A. Gomes in carrying out our work. We appreciate the special efforts of Captain D. Johns and Ivan Côté (Coast Guard Northern, Ottawa) to provide ship time in what turned out to be a very difficult ice year for the Coast Guard. We thank the officers and men aboard the CCGS *George Pearkes* and the CCGS *Nahidik* for transporting our gear to and from the Beaufort Sea and out of Tuktoyaktuk. S. Thomson assisted with advice on style, and with final text-editing. This work, part of the NOGAP B.6 project, was jointly supported by Indian and Northern Affairs Canada, and Fisheries and Oceans Canada.

1 INTRODUCTION

The Northern Oil and Gas Action Program has as one of its sub-projects a major inter-disciplinary study of the oceanography of the Canadian Beaufort Sea (NOGAP B.6). In particular, the objectives of NOGAP B.6 are to determine the transport and fate of materials (especially hydrocarbons) over the Beaufort Shelf, and the primary productivity of these coastal waters. Field work, which started in 1986, is continuing; data reports in the NOGAP B.6 series are listed on the inside of the back cover of this report. During the spring of 1991, our field work focussed on the nearshore zone and the disposition of fresh water from the Mackenzie River under the landfast ice in late winter [*Macdonald et al.; 1992*]. This early season work was followed by a ship-borne effort in September, 1991, oceanographic data for which are reported here (IOS I.D. # 91-70). The sampling program had the following objectives (data summarized in this data report are outlined in **bold** font):

- **Collect chemical (nitrate plus nitrite, silicate, orthophosphate, salinity, temperature, dissolved oxygen, Chl *a*) and CTD data at a deep, time-series station in the Canada Basin.** In addition, measurements were also made for water tracers (tritium, $\delta^{18}O$ and the chloro-fluoro-carbons), and organochlorine contaminants (Green Plan, Arctic Environmental Strategy).
- **Conduct an Intensive CTD and chemistry survey the waters of the Mackenzie Canyon to aid in modelling property transport in this region.**
- Collect a large box core in the Canada Basin (3000 m) to measure pore water properties and to determine sediment concentrations for contaminants (organochlorines, hydrocarbon, Pb).
- Recover and redeploy a deep basin mooring to collect data on currents, water properties, ice thickness and vertical particle fluxes.
- Collect Acoustic Doppler Current Profile (ADCP) data across the shelf break by towing an RD instrument.
- Recover a sediment trap mooring at the Mackenzie Shelf edge (700 m).
- Collect acoustical data while the ship was breaking ice (project carried out by D. Farmer's Ocean Acoustics Group (IOS) on behalf of CCG).
- Recover and redeploy several shallow-water moorings on the Mackenzie Shelf (in support of H. Melling's PERD program).
- Deploy a climate mooring at the shelf edge off the Alaskan Coast (K. Aagaard's program).
- Moor an acoustic recording array and launch several SOFAR floats at the shelf edge (R. Perkin's program).

Due to exceptionally heavy ice conditions in the Beaufort Sea during August - September, 1991, (Fig. 1) we were unable to carry out the program as originally planned. However, a revised sampling program was designed in the field and the results of the physical (CTD) and chemical measurements taken during Sept. 5 – Sept. 18, are reported here.

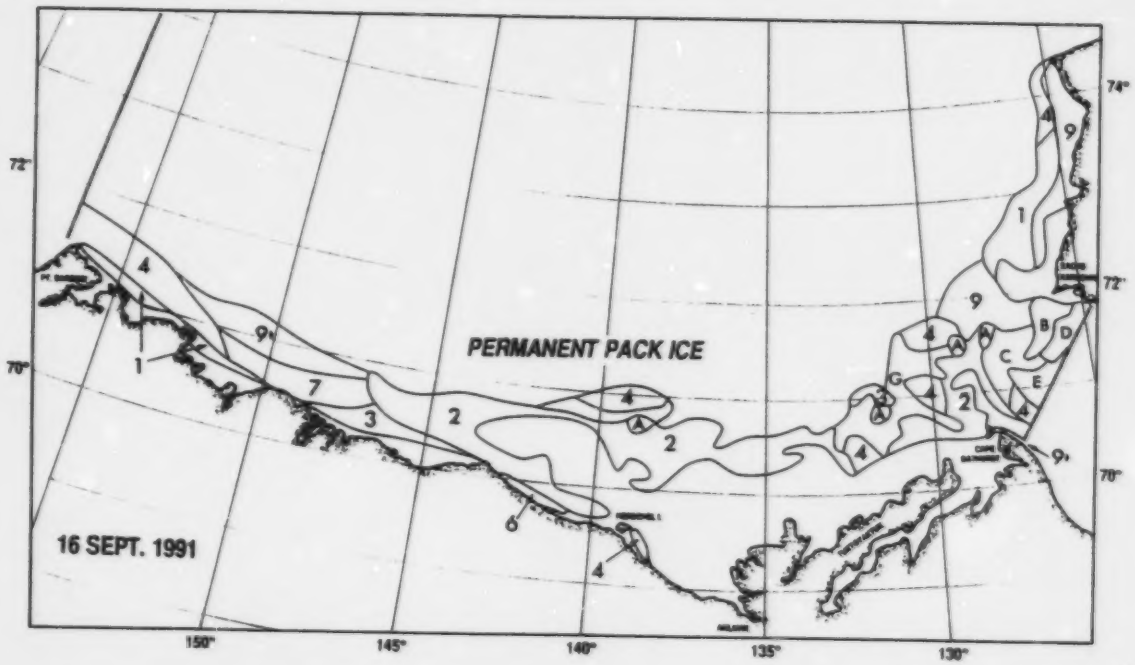

Figure 1: Ice coverage in the Beaufort Sea, Sept. 1991

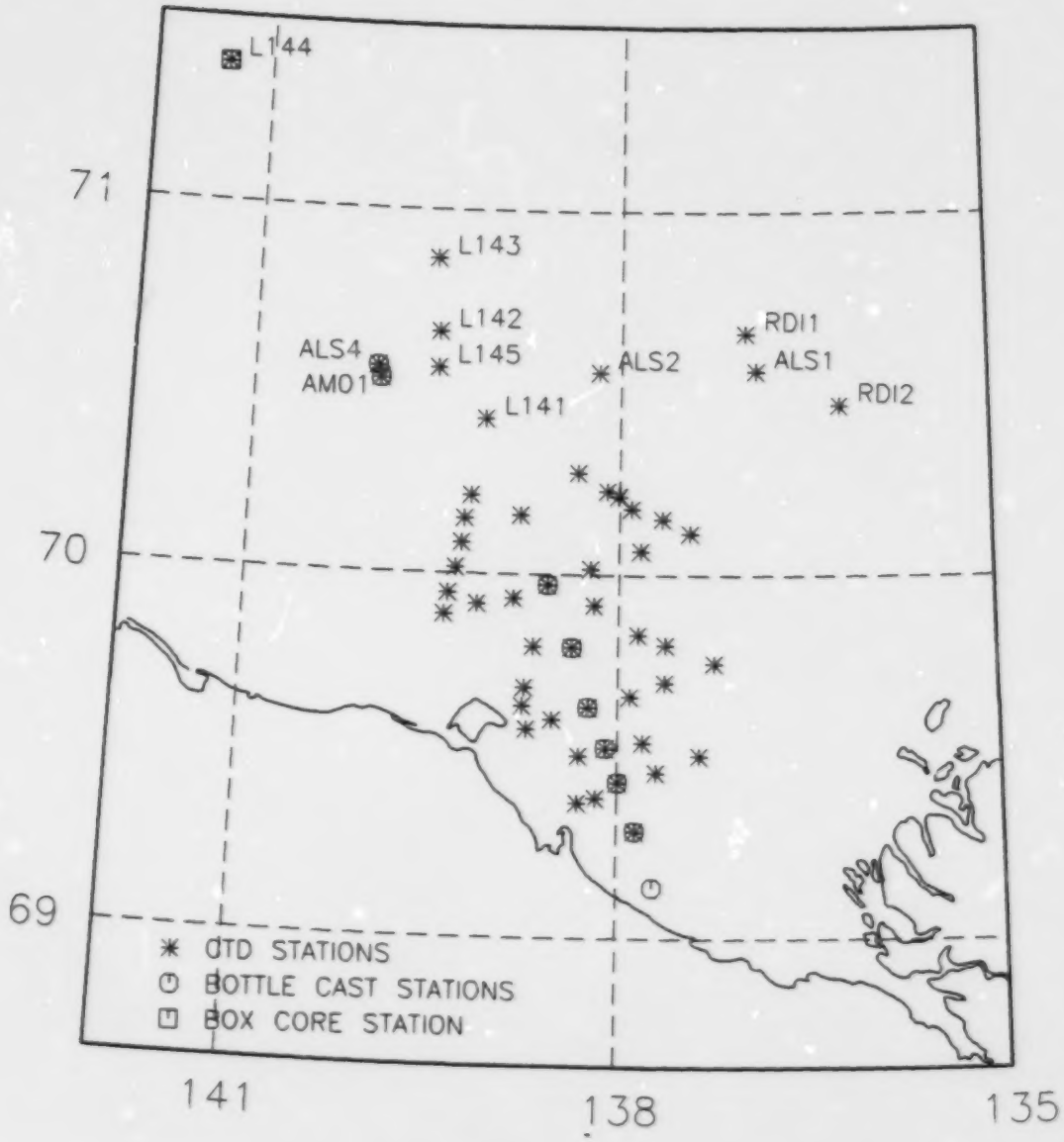

Figure 2: Station locations for Cruise 91-70

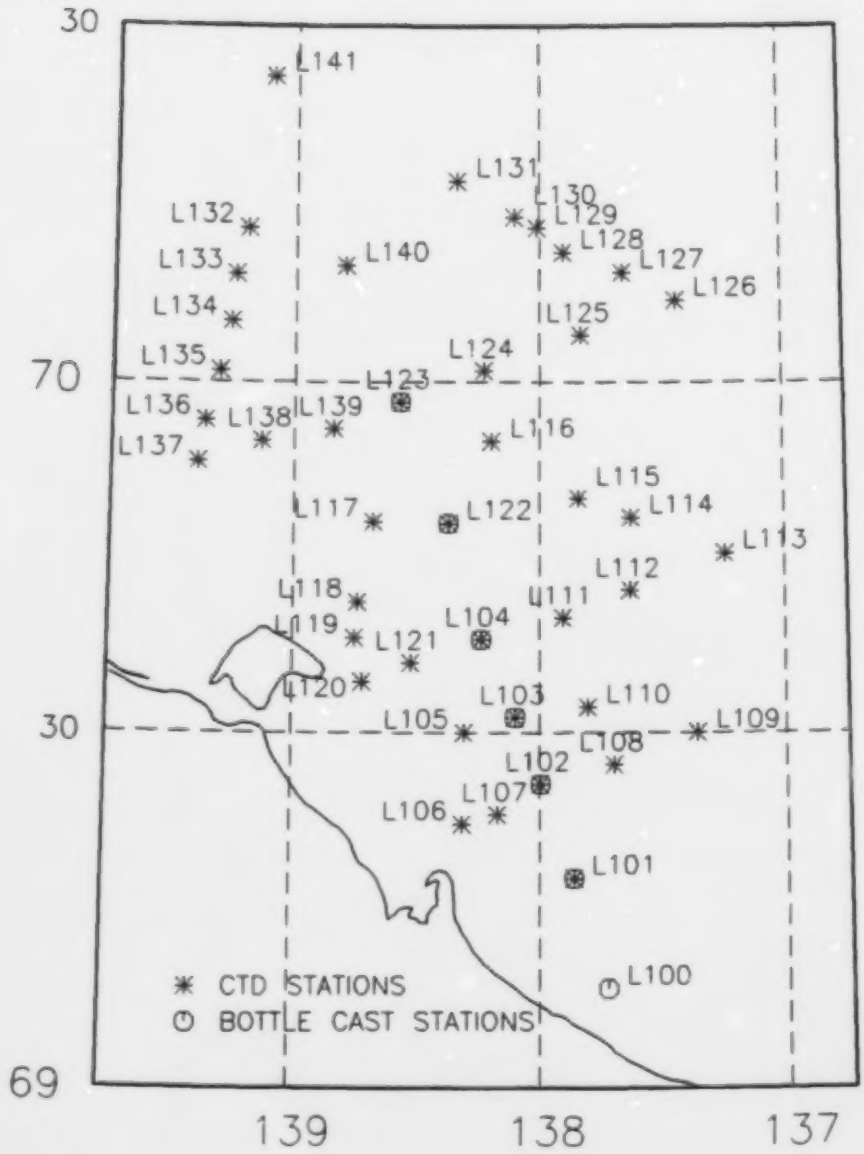

Figure 3: Station locations for the Mackenzie Canyon survey

1.1 Stations

Station locations, shown in Figures 2 and 3, were determined with a Trimble "Trimpack" GPS (Global Positioning System) using C/A code and verified occasionally with the ship's transit Satellite Navigator. The status of Selective Availability is not known for this period. For GPS, the positions are expected to be accurate within about 100 m; for the transit Satellite Navigator, the majority of positions are expected to be within 930 m of the true position, with a mean displacement of about 476 m [*Huggett and Mortimer*, 1971].

2 METHODS

Sampling was carried out from the forward port side of the ship. Two winch pads and A-frame pads were used to mount IOS winches and A-frame transferred from the CCGS *George Pearkes*. The A-frame was used to suspend the block for over-the-side operations. One half of a heated container was used as the wet-lab where Niskin bottles were subsampled and thermometers were read; the other half, which was partitioned by a wall, was dedicated to the Freon (chlorofluorocarbon) analyses. This container was mounted directly on the starboard side of the forward deck.

2.1 Conductivity-Temperature-Depth System

Two Guildline model 8706 probes were used during the cruise, one equipped with a 1500 decibar pressure sensor and a second equipped with a 6000 decibar pressure sensor. Only two casts were made with the 6000 decibar CTD and these were both at station L144 which also had a cast with the 1500 decibar CTD. The 1500 decibar probe was used exclusively at all remaining stations. Data for each probe were logged via 2-conductor cable and slip rings to a deck unit. Simultaneously, data were recorded onto an Toshiba 3200 lap-top computer. Data were collected at a rate of 25 samples per second.

2.1.1 Instrument Problems

During this cruise, data from the majority of CTD casts were corrupted by problems with temperature offsets, conductivity cell drift or both. These problems became apparent when casts were compared with each other, compared with the bottle data, and compared with historical data.

Temperature offsets From cast #29 on, sudden shifts in temperature of about -0.029 C° were observed in many of the casts. Frequently this shift would continue for only a few metres and then return quickly back to normal. In some cases the shift would last for the rest of the cast. Occasionally, a shift was not observed but it was clear from comparisons with other casts and historical data that a shift must have occurred early in the cast. Figure 4 (cast #31) shows an example of one of the more obvious temperature shifts that occurred in data from this cruise.

Bench tests performed on the CTD after the cruise showed that there was an intermittent connection on one of the temperature probe leads. This, the only problem identified with the temperature sensor, probably produced the shifts seen in the data. Post-cruise temperature calibration agreed with the pre-cruise calibration to within the accuracy of the instrument.

From casts #29 through #37, the shifts appeared only after the probe had descended to a depth of 80 m to 150 m. The actual depth at which the temperature shifts would start varied from cast to cast and there is no apparent pattern. From cast #38 on, the shifts occurred at a shallow depth (0 m to 15 m). In many of these casts it is not possible to see a temperature shift, probably because it occurred in the thermocline when the temperature and salinity were changing rapidly

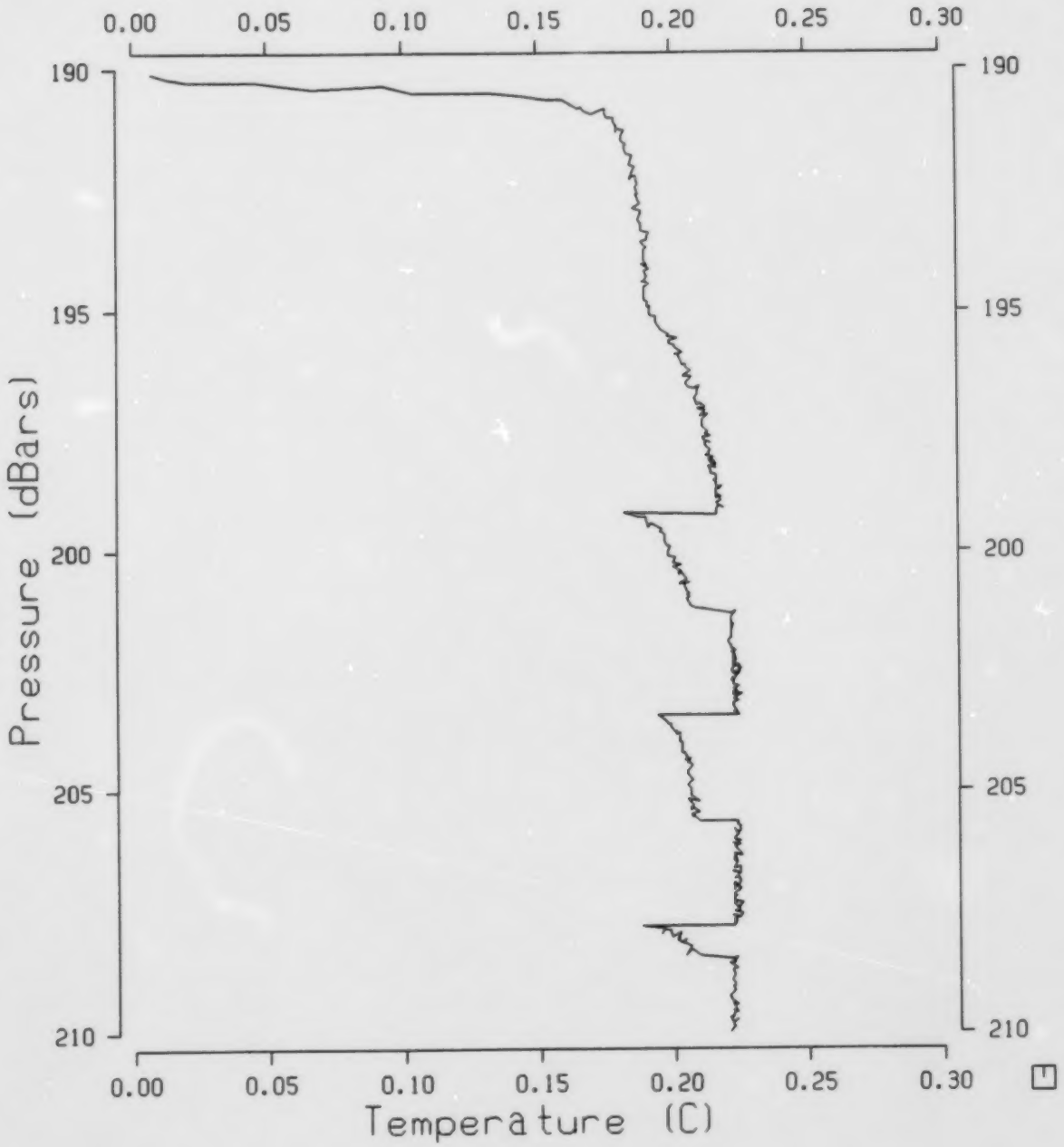

Figure 4: An example of the observed temperature shifts (Station L124, cast #31)

with depth and time. In all cases, however, comparison between casts, bottle data and historical data indicate the presence of temperature shifts in these casts.

The magnitude of the temperature shift is nominally about -0.029 C°. This is the apparent average value of the shifts and the value which gives results most consistent with historical data. When the data were edited, 0.029° was added uniformly to all apparently erroneous temperatures so as to preserve intercomparability between the casts. Salinities were recomputed from corrected temperatures. A more precise list of the corrections applied to the CTD data for each station is given at the beginning of Appendix 1.

Conductivity Cell Drift The 6000 m CTD was observed in the field to have a bad conductivity cell; therefore, data from this instrument are not included in this report. A problem also occurred with the 1500 m probe from casts #56 on. The average salinity, as a function of depth, was compared between casts #49 to #55 and casts #56 to #59 and cast #61 (Fig. 5). From 400 m and deeper there is an approximately linear relationship between the salinity difference and depth. This is diagnostic of a small leak in the conductivity cell which causes a decrease in measured conductivity.

The assumption that the salinity error is due to a leak in the conductivity cell is supported by an event that occurred during cast #56. During the cast, the CTD was stopped for 3 minutes at 535 m so that the ship could be moved to avoid drifting ice. The temperature remained stable, however the conductivity decreased during this time period producing a shift of -0.02 PSU in salinity which persisted until the end of the cast. This suggests that the observed salinity errors are not solely a function of depth but also depend on the amount of time the CTD is under pressure.

Note that Figure 5 represents the salinity differences between the two sets of casts after corrections for temperature shifts have been made and after cast #56 had the conductivity shift at 535 m removed.

A linear least squares fit of the salinity differences between the two sets of casts for depths greater than 400 m was calculated (dashed line in Fig. 5) and the following formula was determined for correcting the salinities in casts #56 to #62:

$$Sal_{Corr} = Sal_{Uncorr} + 3.887 \times 10^{-2} + 2.822 \times 10^{-5} \times \text{Pressure}$$

2.1.2 Data Processing

The steps outlined below were performed in the processing of each CTD cast.

1. The raw values for pressure, temperature, and conductivity were converted to engineering units using calibration coefficients determined in pre-cruise laboratory calibrations.

2. Each cast was processed to compensate for the differences in the time responses of the temperature sensor and the conductivity cell. This was done by digitally convoluting the temperature data with the conductivity cell's time response and the conductivity data with the temperature probe's time response. This aligns the two sets of values so that each temperature–conductivity pair represents a measurement from the same sample of water.

3. Salinity was calculated from temperature and conductivity using the *UNESCO* algorithms [*Fofonoff and Millard*; 1983].

4. Erroneous values (spikes) were removed from the data using both automatic and manual techniques.

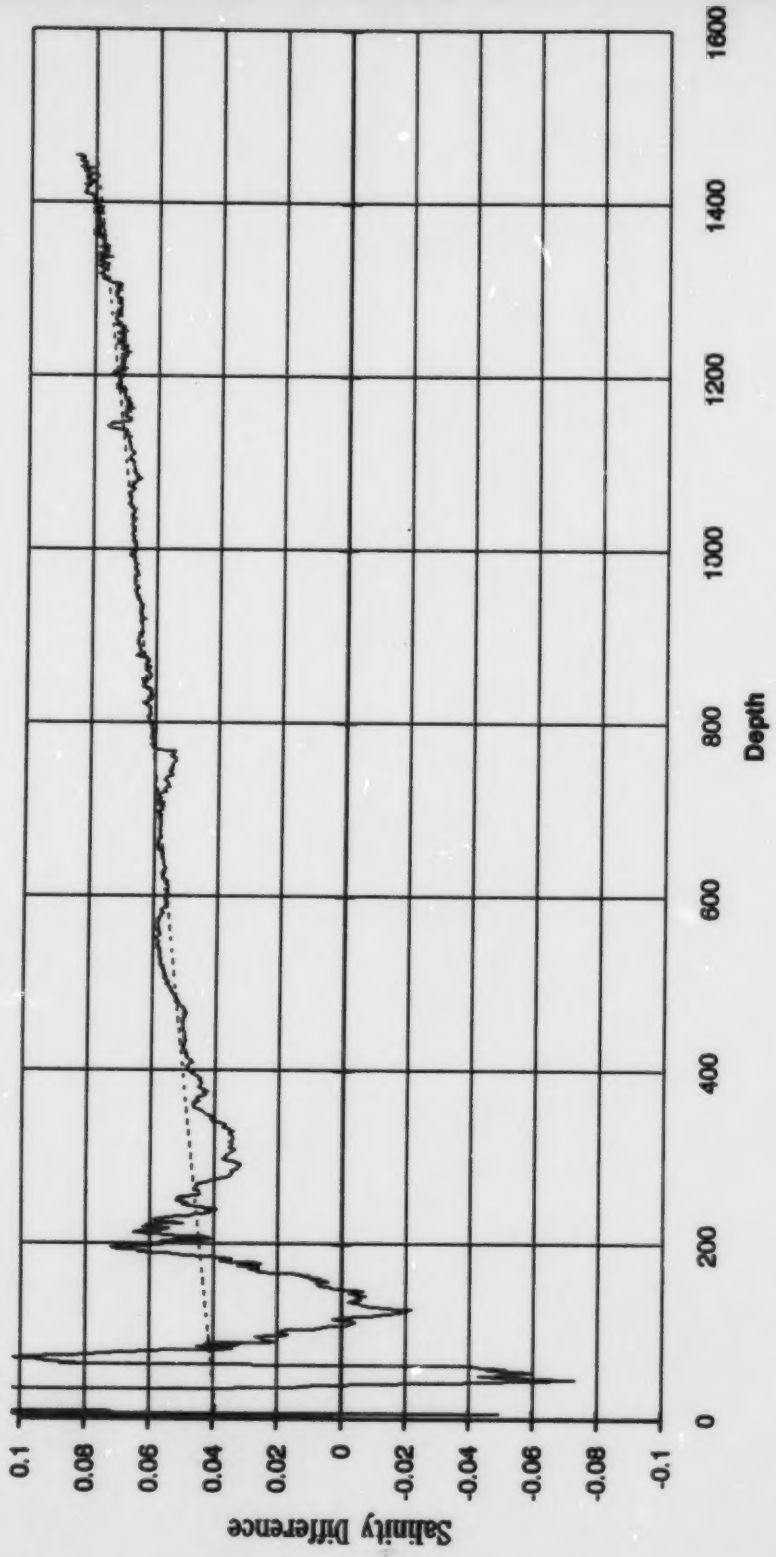

Figure 5: Salinity difference (casts #49 to #55 - casts #56 to #59 and #61) illustrating the drift in salinity ($\approx$ 0.04 psu from 400 m to 1400 m) caused by a leaking conductivity cell on the later casts.

5. The pressure readings for each cast were smoothed using an 11 point (0.4 m), un-weighted, running average. This was done to eliminate noise in the data introduced by the pressure sensor prior to the next steps being performed.

6. Any readings taken during periods in which the CTD probe was falling at less than 0.3 m/s were removed from the data sets.

7. The pressure data for each cast was made monotonic by removing any data values from the casts in which the pressure was less than in the previous data value accepted.

8. At this point the problems outlined in the above section were addressed. Measures taken to correct the specific casts are listed by cast # at the front of Appendix 1.

9. The pressure, temperature, and salinity data for each cast were decimated into one-metre bins using simple averaging.

10. Derived quantities were calculated from the pressure, temperature, and salinity data using the algorithms given in *Fofonoff and Millard*, [1983] and *UNESCO*, [1987].

11. The decimated data and derived quantities were used to produce the plots and tables found in Appendix 1.

2.1.3 Data Validation

To validate the CTD readings taken during the cruise, comparisons were made between the CTD data at stations L101-L104, L122, L123, AM01, ALS4, and L144 with the bottle samples taken at those stations. The bottle data were collected and analyzed for temperature and salinity as part of the chemical program. In the intercomparison, it should be noted that the CTD casts and bottle samples were not collected simultaneously, and that depth for the CTD was determined from the pressure sensor, while depth for the bottles was estimated by the "wire out" and measured wire angle (checked with unprotected thermometers where possible). Therefore, the difference in the intercomparison can be ascribed partly to environmental variance and partly to offset in depth between the two methods.

From the distributions of temperature and salinity differences as a function of depth (Fig. 6, 7) and previous experience, we determined that only samples from deeper than 300 m should be used in the bottle – CTD intercomparisons. Stations sufficiently deep for this were L123, AM01, ALS4, and L144.

To quantify the bottle – CTD intercomparison, the property differences $D = X_{Bottle} - X_{CTD}$ were calculated for each point (S and T) below 300 m and the results are reported in Table 1 as mean difference and standard deviation of the difference. The statistics show that there is no significant difference between the bottle data and the CTD data for either temperature or salinity.

The 91-70 data (corrected for instrument errors) have been compared with historical data collected in the months of April and May from 1981 to 1991 in the same region (Fig. 8).

Figure 9, a TS plot (200 m - 1000 m) of the historical data including 91-70, shows very little change in TS characteristics over time. The deep water below the temperature maximum is particularly stable with a spread of only 0.02 PSU over the years. The 91-70 data compares well in this range although the spread is slightly larger. The value of the temperature maximum does change from year to year with a spread of approximately 0.1C°. The 91-70 temperature maximum is lower than average but agrees well with the April 1991 data when plotted separately with that data. The differences between the 91-70 data and historical data above the temperature maximum could

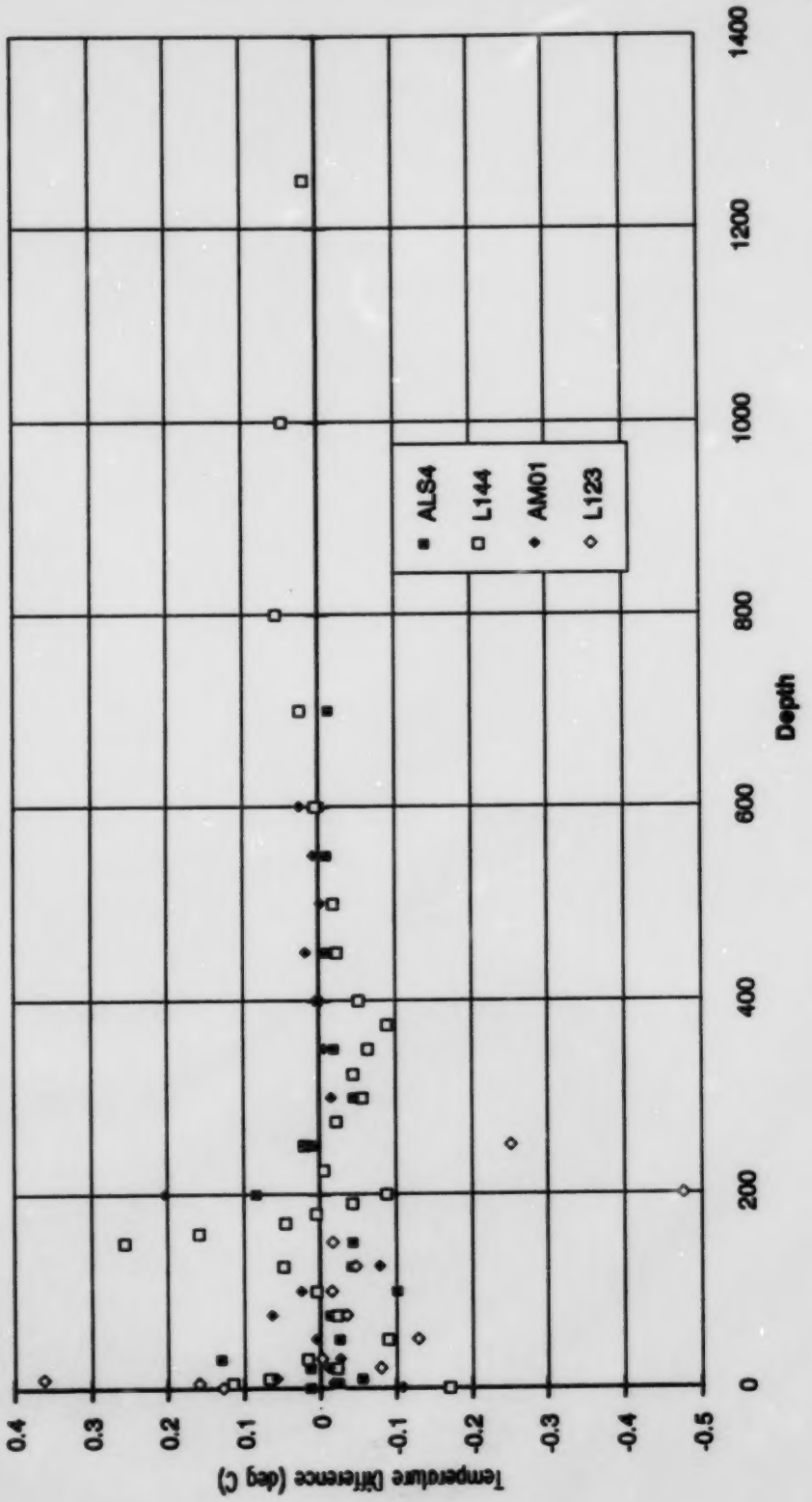

Figure 6: Temperature intercomparison, T_{Bottle} - T_{CTD}; depth is in metres

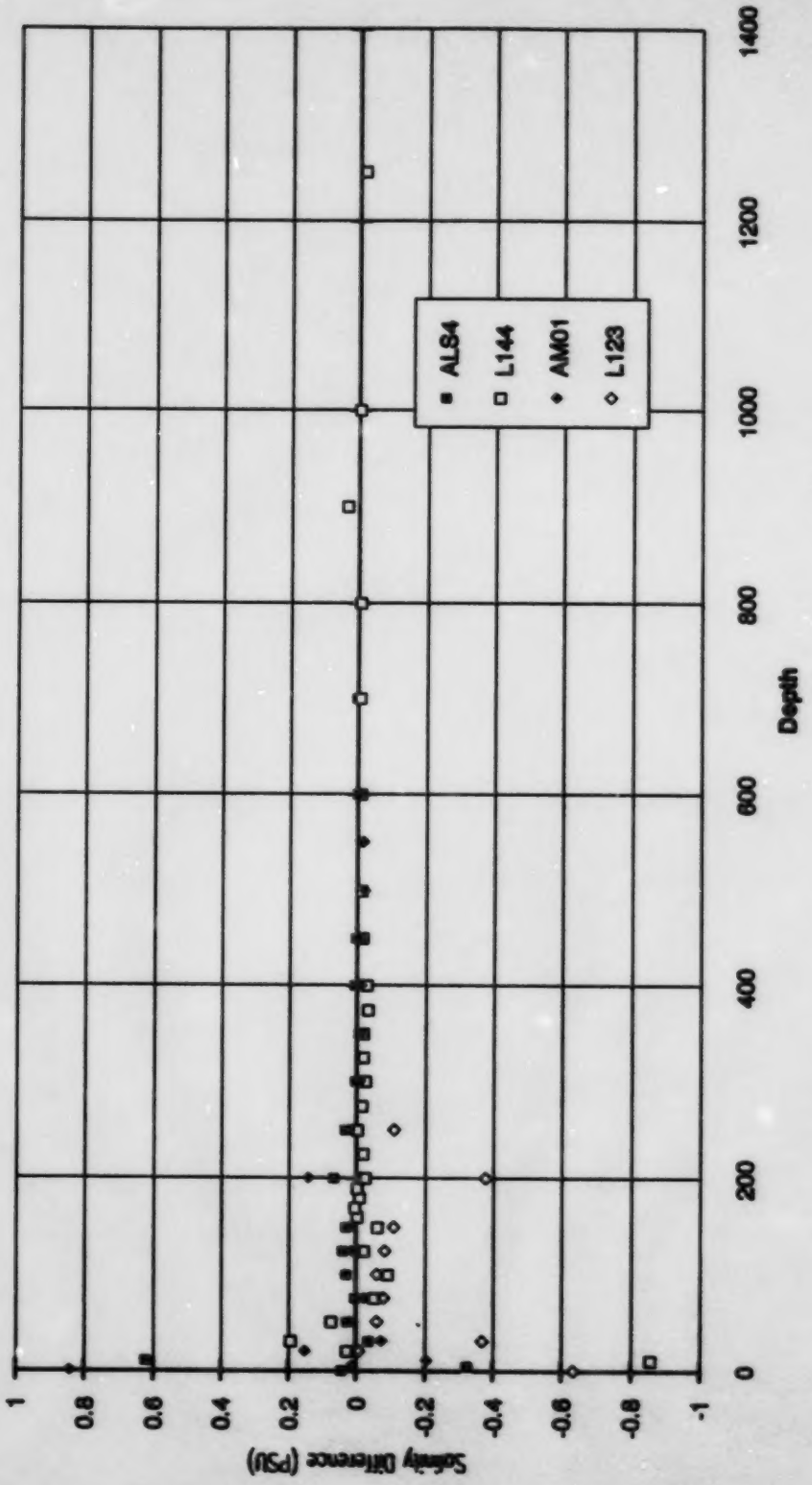

Figure 7: Salinity intercomparison, S_{Bottle} - S_{CTD}; depth is in metres

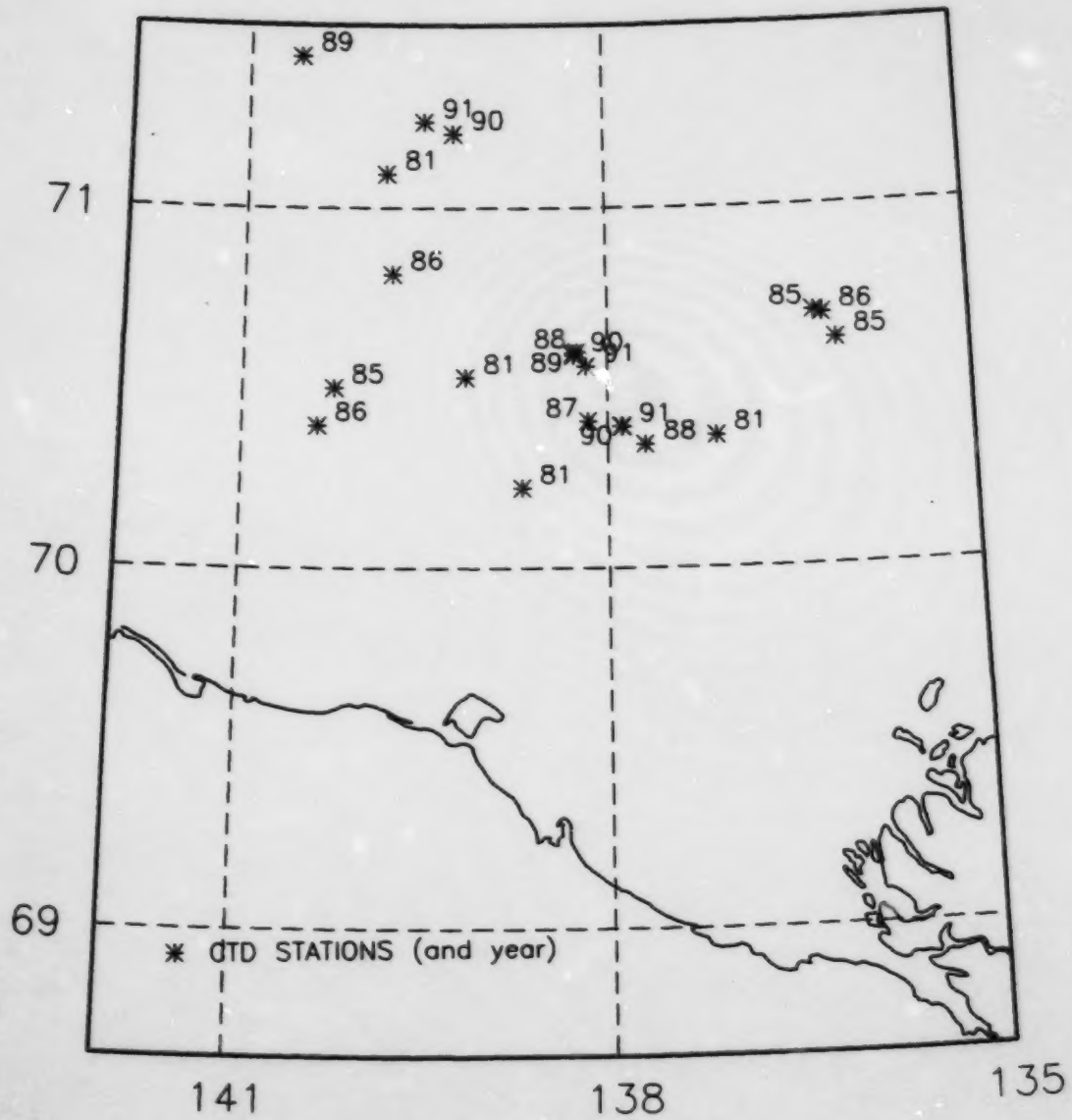

Figure 8: Station locations for historical data used to validate the data reported here; stations are identified only by the year they were occupied.

be partly due to actual variations in the region but our experience from working with these data suggests that these differences are most likely due to the instrument problems with temperature.

Table 1: Salinity and temperature differences (Bottle - CTD) for depths below 300 m

	Temperature	Salinity
Mean Difference	-0.00417	-0.0097
Standard Deviation	0.0346	0.0101
n	24	23

2.2 Water Chemistry

2.2.1 Field Sampling

Water samples were collected with 1.7 L or 5 L Niskin bottles equipped with reversing protected and unprotected thermometers. Subsampling from the bottles followed the normal oceanographic procedure of first withdrawing dissolved oxygen and tritium samples (using latex tubing), followed by salinity, oxygen isotope, and nutrient samples. Finally, the remaining water was transferred to a twice rinsed, 2 L polybottle for chlorophyll *a* samples.

2.2.2 Laboratory Methods

Errors for the various methods reported here are expressed as precision and accuracy as summarized in Table 2. Pooled variance, s_p, is calculated as

$$s_p = \sqrt{\frac{\nu_1 s_1^2 + \cdots + \nu_i s_i^2}{\nu_1 + \cdots + \nu_i}}$$

where $\nu_i = n_i - 1$ degrees of freedom, and the n_i and s_i refer to the number of replicates and their standard deviation for the individual components used in the pooled standard deviation calculation.

Salinity Salinity samples were drawn into 200 mL salinity bottles, after 3 rinses, from 5 L or 1.7 L Niskin bottles. The samples were then capped tightly until determination.

Table 2: Estimates of error: basis of calculation and error models are given in the text.

measurement	units	precision (s_p)	Standard Reference Material
Salinity	psu	0.010	IAPSO Seawater
Temperature	C°	0.026	NBS Calibration
Silicate	mmol m^{-3}	0.56	Sagami SiO_2
Nitrate	mmol m^{-3}	0.092	Sagami KNO_3
Phosphate	mmol m^{-3}	0.03	Sagami KH_2PO_4
Dissolved Oxygen	mmol m^{-3}	1.2	Sagami KIO_3
Chl *a*	mg m^{-3}	$\leq$ 0.03	No SRM available

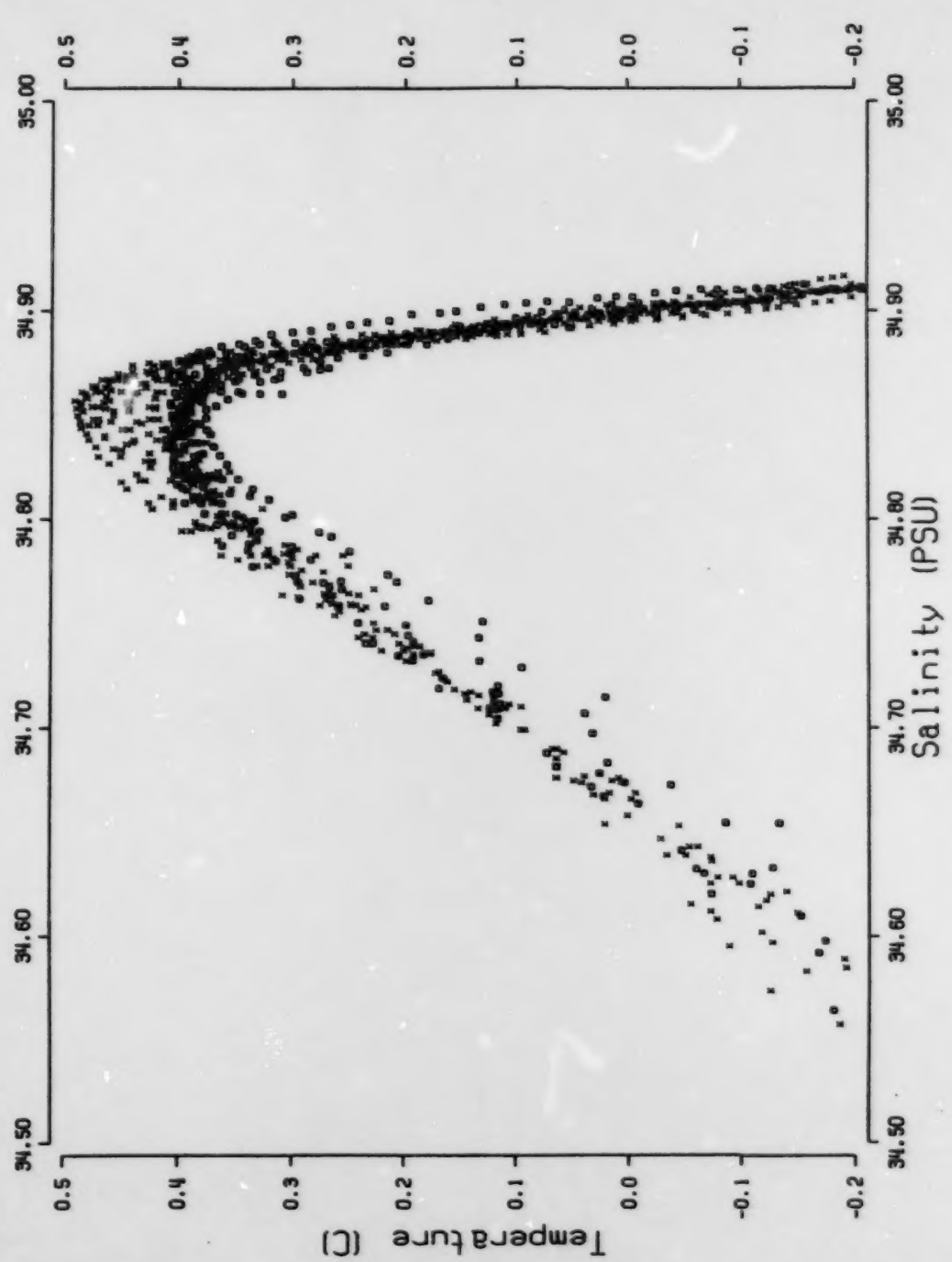

Figure 9: TS plot for the depth range 200 m - 1000 m showing the comparison between historical data (×) collected in the region (Fig. 8) and the 91-70 data (□).

The salinities were analyzed on a Guildline Autosal (Model 8410) instrument at the Institute of Ocean Sciences; data are reported in practical salinity units (psu) [*Lewis and Perkin*, 1978]. During analyses the instrument was standardized against Standard Sea Water of salinity 34.995 (K_{15} = 0.99986). The Standard Sea Water was obtained from Standard Seawater Service, Institute of Oceanography, Wormley, Godalming, Surrey, England. Standard deviation of repeated measurements on the same sub-sample was less than 0.0005 psu. Precision of the sampling/analysis was evaluated from independent duplicate samples drawn occasionally from the Niskin bottles; we found the pooled standard deviation, $s_p = 0.010, \Sigma\nu = 4$.

Temperature Temperature was measured with paired, oceanographic thermometers (low temperature) manufactured by Richter and Weise (Berlin), Yoshino Factory (Tokyo) or Gohla (Kiel). These were read twice to the nearest 0.01 C°. Precision, based on agreement between pairs, was s_p=0.041 C° for all data (ν = 114), s_p=0.068 C° ($\Sigma\nu$ = 28) for water measurements taken from the top 10 m and s_p=0.026 C° for readings taken from deeper than 10 m ($\Sigma\nu$ = 86). Unprotected reversing thermometers were used to check depth as determined by the length of wire out.

Dissolved Oxygen Dissolved oxygen samples were 'pickled' immediately on deck and taken to the ship's laboratory for determination by the Micro-Winkler technique [*Carpenter*, 1965]. Analyses were carried out within 24 hours of collection. Calibration of the thio-sulphate solution was performed with each titration set (daily) by using Sagami primary standard KIO_3. Precision of the method was routinely monitored with blind replicate samples drawn from the Niskin bottles. For the data reported here we obtained the following results on replicates: s_p = 1.2 mmol m^{-3}, $\Sigma\nu$ = 41.

Nutrients Samples for nutrient determination were collected into twice rinsed glass and polystyrene test tubes (2 glass and 2 polystyrene tubes per sample).

Nutrients (silicate, nitrate plus nitrite, and phosphate) were determined aboard ship using Technicon Autoanalyzer II components. Reactive silicate and nitrate plus nitrite were determined according to Technicon Industrial Methods No. 186-72 W and 158-71 W respectively, and soluble orthophosphate was determined using a modified Technicon method [*Brynjolfson*, 1973]. Sagami standards were used to calibrate secondary standards which were prepared daily in 30.5 g/L NaCl solutions. Most of the nutrient samples were analyzed in duplicate, the average being reported. The precision of the determinations, based on these duplicates, was found to be: silicate, s_p= 0.56 mmol m^{-3}, $\Sigma\nu$ = 135; phosphate s_p= 0.03 mmol m^{-3}, $\Sigma\nu$ = 135; nitrate, s_p= 0.09 mmol m^{-3}, $\Sigma\nu$ = 134.

Chlorophyll *a* Chlorophyll *a* samples were taken only for the top 150 m at the deepest station (L144). Samples were filtered immediately, taking care to restrict light. Water samples (2 L), taken in duplicate, were filtered through 24-mm diameter Whatman GF/F glass fiber filters. The inside of the filtration funnel was rinsed with about 10 mL filtered sea water and approximately 1 mL of 1% $MgCO_3$ solution was added to the samples just before filtration was complete. After filtration, the filters were folded in half, placed in filter paper folded into quarters, labelled, and stored frozen in a dark bottle containing silica-gel in a deep freezer. At IOS chlorophyll *a* was determined fluorometrically with a Turner Design fluorometer [*Strickland and Parsons*, 1972]. Blanks, estimated from the deepest samples (125 m and 150 m, where chlorophyll concentrations are low), were $\leq$ 0.03 mg m^{-3}. Pooled standard deviation of replicates was estimated to be less than 0.04 mg m^{-3} (n=4).

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4 APPENDIX 1; CTD DATA; TABLES AND PLOTS

Units and abbreviations used in the computer listings which are included in the following appendix are summarized below.

Measurement	Abbreviation	Units
PRESSURE	PRESS	decibars
DEPTH	DEPTH	m
TEMPERATURE	TEMP	°C
POTENTIAL TEMP	THETA	°C
SALINITY	SAL	psu-78
DENSITY†	SIGMA T	kg/m^3
DYNAMIC HEIGHT ANOMALY	DYN HT	m
SPECIFIC VOLUME ANOMALY	SVAN	$10^{-8}m^3/kg$
BRUNT VAISALA FREQUENCY	POT EN	1/s
SOUND SPEED	SOUND SPEED	m/s

† The quantity reported for density is actually $\gamma(S,t,0)$ [UNESCO, 1987].

A listing of how problems were addressed for individual casts

cast # 1-26 These casts showed no evidence of temperature shifts or spikes of any kind. This is not conclusive, however, because a shift of 0.03 C° could easily be hidden in the dynamic temperature and salinity structure throughout these casts.

cast #29 Shift in temperature of approximately - 0.03 C° at 93.5 m. Below this depth there were no more obvious shifts. 0.029 C° added to temperature for points below 93.5 m and salinity was recalculated.

cast #30 A Shift of -0.01° C was seen at 114 m. Below this depth there are no more obvious shifts. Comparison with bottle data at this station suggested that the temperature is low by perhaps 0.03 C°. 0.029 C° was added to temperature for points below 114 m and the salinity was recalculated.

cast #31 This cast was plagued by temperature shifts in the order of 0.03 C° starting at approximately 138 m. Each shift lasts for several metres and then the temperature returns to normal. A graphical editor was used to interpolate the temperature across the shifts and the salinity was recalculated.

cast #32, 33, 34 No evidence of temperature shifts in these casts.

cast #35 There was a permanent shift of -0.02 C° at 84.1 m and evidence of temporary shifts at 29 m to 32 m. A graphical editor was used to interpolate the temperature across the temporary shifts, 0.029 C° was added to points below 84.1 m and the salinity was recalculated.

cast #36 This cast was plagued by temperature shifts of ≈0.03 C° starting at ≈ 107 m. The shifts last for several metres and then the temperature returned to normal. A graphical editor was used to interpolate the temperature across the shifts and salinity was recalculated.

cast #37 This cast was plagued by temperature shifts of ≈0.03 C° starting at ≈150 m. The shifts lasted for several metres and then the temperature returned to normal. A graphical editor was used to interpolate the temperature across the shifts and salinity was recalculated.

cast #38, 39, 40, 41 No direct evidence was found for temperature shifts in these casts, however, comparisons with the other casts and with historical data indicated that the temperature was low by about 0.03 C°. 0.029 C° was added to temperature over entire casts and the salinity was recalculated.

cast #42 Temperature shift of -0.03 C° was found at 3 m. 0.029 C° was added to temperature for all depths below the depth of shift and the salinity was recalculated

cast #43 Temperature shift of -0.03 C° was found at 7.75 m. Correction applied below 7.75 m as in #42.

cast #44 Temperature shift of -0.03 C° at 12.5 m. Correction applied below 12.5 m as in #42.

cast #45 Temperature shift of -0.03 C° was found at 11.5 m. Correction applied below 11.5 m as in #42.

cast #48 Temperature shift of -0.05 C° was found at 5.5 m. Correction applied below 5.5 m as in #42.

cast #49 Temperature shift of -0.03 C° was found at 70 m. From 87 m to 108 m there were several temperature shifts back to normal that lasted for less than 1 metre. Below 108 m temperature remained shifted. A graphical editor was used to interpolate across temperature fluctuations in the 87 m to 108 m range causing all readings in this range to be 0.030 C° low. Then, 0.029 C° was added to all temperatures below 70 m. and the salinity was recalculated.

cast #50 Temperature shift of -0.03 c° was observed almost at the very start of the cast. From 0 m to 350 m there were several segments (< 1 m) in which the temperature returned to normal. The temperature was normal from 350 m to 410 m. Temperature was shifted by -0.03 C° from 410 m down. A graphical editor was used to interpolate across temperature fluctuations in the 0 to 350 m range causing all readings in this range to be 0.030 C° low. 0.029 C° was then added to all temperatures in the 0 to 350 m range and from 410 m down. The salinity was recalculated.

cast #51-52 These casts were done with the 6000 m CTD, and have been omitted.

cast #53 A temperature shift of -0.03 C° was observed near the start of the cast. From 65 m to 375 m there were several segments (< 1 m) where the temperature returned to normal. A constant temperature shift of -0.03 C° was observed below 375 m. A graphical editor was used to interpolate across temperature fluctuations in the 65 m to 375 m range causing all readings to be 0.030 C° low. 0.029 C° was then added to all temperatures in the cast and salinity was recalculated.

cast #54 No direct evidence was found for temperature shifts in this cast, however, comparisons with the other casts and with historical data indicate that the temperature was low by 0.03 C°. 0.029 C° was added to temperature over the entire cast and salinity was recalculated.

cast #55 A temperature shift of -0.03 C° was observed from near the start of the cast. From 133 m to 178 m there were several segments (< 1 m) where temperature returned to normal. A constant temperature shift of -0.03 C° was observed below 178 m. A graphical editor was used to interpolate across temperature fluctuations in the 133 m to 178 m range causing all readings to be 0.030 C° low. 0.029 C° was then added to all temperatures in the cast and salinity was recalculated.

cast #56-62 Conductivity cell problems, outlined in the text, began here. From this cast on, there was no direct evidence of shifts in temperature. Comparing the T-max value of these casts with casts 49 to 55, however, suggests that the temperature was low by 0.30 C°. Therefore, cast 56 was corrected by shifting the salinity at depths below 535 m by 0.02 PSU and the conductivity was recalculated. Then, 0.029 C° was added to the temperature in all casts 56-62 and the salinity was recalculated. The salinity was adjusted in the 56-62 casts as follows: Corrected Salinity = Uncorrected Salinity + 0.03887 + 0.00002822 × pressure. The conductivity was recalculated.

4.1 Narrative on Processing the CTD Casts

"The Casts from Hell"

Of all of the processing adventures that I have endeavored to put to paper, by far the most grisly is the case of the *CTD Casts from Hell.* Although I have not yet rid myself of the annoying tick in my right cheek, I feel that the time has come to make a full accounting of the terrible facts concerning this incident.

It was a dark and stormy night as I was crossing the magnetic media wastelands known commonly as my "hard disk." My task was simple enough, I was to go to the address of *9170 CTD Lane* and seek out there its inhabitants. I was to bring to light what manner of evils lurked therein and cause those in error to mend their ways and conform to the patterns of the good ones amongst them. I felt well prepared for the task as I had quite recently been successful on two quite similar cases, but I now know it was folly to make such premature assumptions.

As readers of my other accounts will attest, I have always found that where evil lurks there may also be found those of good character to whom I have been able to turn for an example of how one should behave. I was justifiably shocked, therefore, to find that 9170 was such a den of iniquity that not one of it's inhabitants could be found righteous. To be sure, there were the young amongst those there who appeared without blemish, but they were all too shallow to be used to instruct the more mature (and deep) members of the community. In fact, it appeared that the more pressure a given member was under, the worse his character.

I must confess that if I had been acting of my own accord, I would have left this evil place to fester in its own iniquity and moved on to safer adventures. I was, however, bound by an oath to those that sent me to do whatever I could to save this wretched lot.

Being at a loss to solve the problem on my own, I endeavored to seek out the "wise one," the keeper of the old knowledge, who dwells in the outer world. He is known to some as "*Carma*", which means "the one who shifts places" or "the absent one." I had sought out the great *Carma's* help in previous cases and found him to be singularly helpful (whenever I was able to find him).

As a side note, the reader might be interested in the phenomena of the great *Carma's* chambers. It seems that great magical powers inhabit this place so as to be able to transport *Carma* in and out without any visible means. Several adventurers have noted that upon the occasion of meeting with *Carma* in his chambers, they have inadvertently allowed their gaze to be shifted from him for only a second and found that when they looked for him again he was gone. This can be terribly frustrating because only chance dictates when he will appear in his chambers again. Also, even when he is in his chambers he is usually in a trance "telecommunicating" with other "wise ones" in distant lands, and is unavailable to impart his wisdom.

Despite these overwhelming obstacles, I was able to meet with *Carma* several times to discuss the evils of the 9170 community. He was able to look into the "old knowledge" and advise me as to how the members should conduct themselves. Also, although I found no one righteous in the group, I was able to find a little good in each one and so considering them all together was able to see through their sins to the righteousness that lay inside.

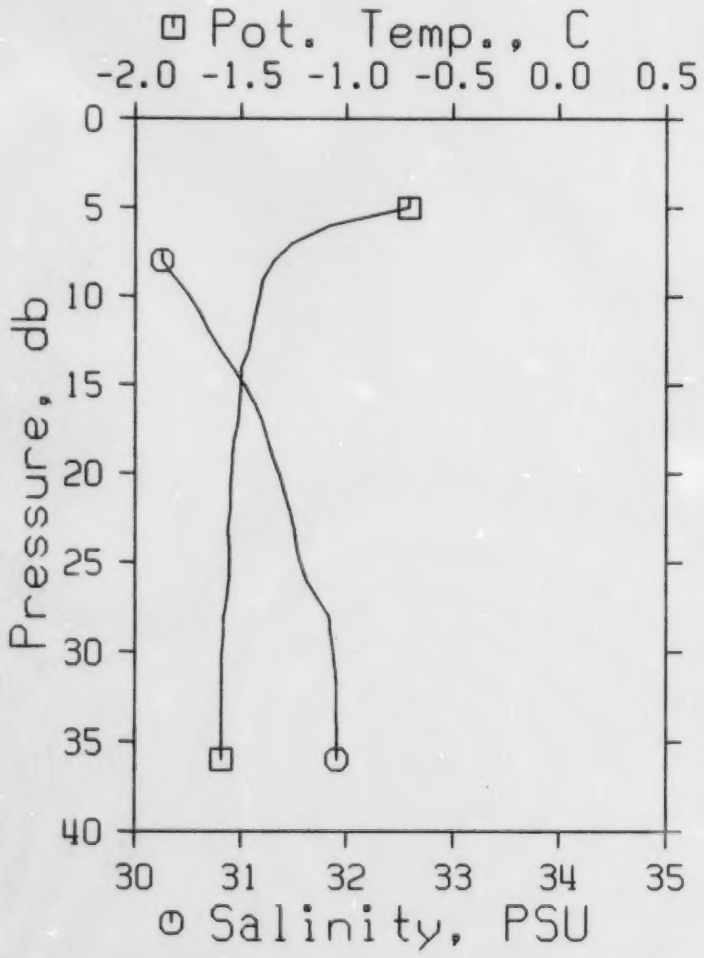
It was only time, then, that separated me from my goal as I had to meet with each member individually and purge the evil from him. Finally my task was done, the demons being exorcised from the CTD Casts from Hell. I will not presume to say that they are now perfect, (for who knows what evil lives deep in the hearts of data?) but they are useful, and is that not all that anyone can ask?

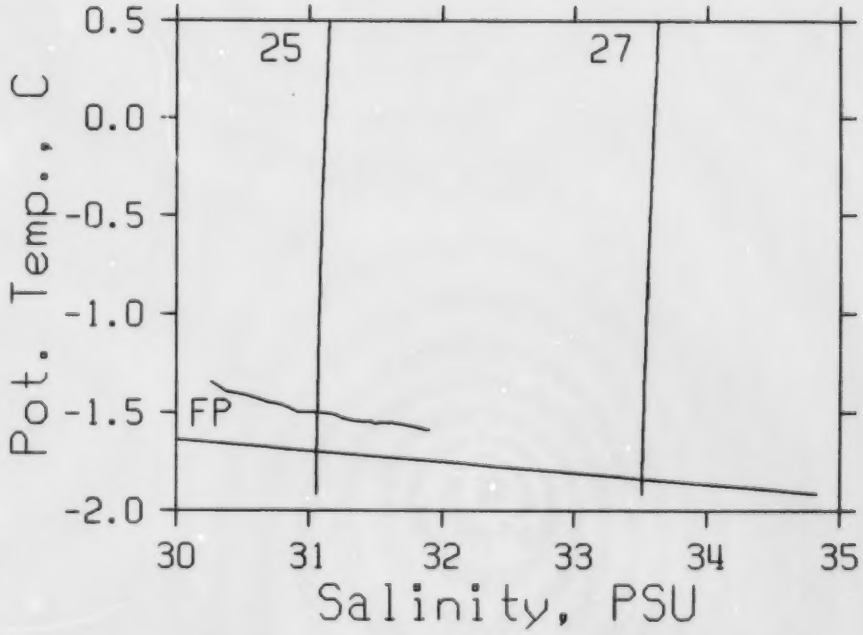
Rick Pearson (Mad Programmer)

Station	Latitude	Longitude	CTD Casts		Bottle
			1500	6000	
L101	69° 25.62'N	137° 51.72'W	3		YES
L102	69° 25.62'N	137° 59.76'W	4		YES
L103	69° 31.32'N	138° 05.82'W	5		YES
L104	69° 37.98'N	138° 14.10'W	6		YES
L105	69° 30.00'N	138° 18.12'W	7		
L106	69° 22.20'N	138° 18.42'W	8		
L107	69° 23.04'N	138° 10.02'W	9		
L108	69° 27.30'N	137° 41.82'W	10		
L109	69° 30.00'N	137° 21.66'W	11		
L110	69° 32.16'N	137° 48.24'W	12		
L111	69° 39.84'N	137° 54.24'W	13		
L112	69° 42.18'N	137° 37.74'W	14		
L113	69° 45.36'N	137° 14.64'W	16		
L114	69° 48.42'N	137° 37.56'W	17		
L115	69° 50.04'N	137° 50.52'W	19		
L122	69° 47.94'N	138° 22.08'W	20		YES
L121	69° 35.94'N	138° 31.08'W	22		YES
L120	69° 34.32'N	138° 42.90'W	23		
L119	69° 38.10'N	138° 44.94'W	24		
L118	69° 41.16'N	138° 44.22'W	25		
L117	69° 48.06'N	138° 40.44'W	26		
L116	69° 54.96'N	138° 11.64'W	29		
L123	69° 58.32'N	138° 34.02'W	30		
L124	70° 00.96'N	138° 13.56'W	31		
L125	70° 04.02'N	137° 49.74'W	32		
L126	70° 06.96'N	137° 26.22'W	33		
L127	70° 09.30'N	137° 39.36'W	34		
L128	70° 10.98'N	137° 54.24'W	35		
L129	70° 13.08'N	138° 00.72'W	36		
L130	70° 13.98'N	138° 06.18'W	37		
L131	70° 16.98'N	138° 20.22'W	38		
L132	70° 13.02'N	139° 12.18'W	39		
L133	70° 09.12'N	139° 15.00'W	40		
L134	70° 05.16'N	139° 16.08'W	41		
L135	70° 00.96'N	139° 18.78'W	42		
L136	69° 56.70'N	139° 22.20'W	43		
L137	69° 53.16'N	139° 23.88'W	44		
L138	69° 54.96'N	139° 08.04'W	45		
L139	69° 55.98'N	138° 50.46'W	48		
AM01	70° 32.10'N	139° 58.26'W	49		YES
L144	71° 22.38'N	141° 23.10'W	50	51,52	YES
ALS1	70° 33.96'N	136° 54.36'W	53		
ALS2	70° 33.54'N	138° 10.56'W	54		
ALS4	70° 34.08'N	140° 00.06'W	55		YES
L143	70° 51.90'N	139° 32.22'W	56		
L142	70° 39.96'N	139° 30.12'W	57		
L145	70° 34.02'N	139° 30.12'W	58		
L141	70° 25.74'N	139° 06.00'W	59		
L140	70° 09.84'N	138° 47.76'W	60		
RDI1	70° 40.08'N	136° 59.46'W	61		
RDI2	70° 28.26'N	136° 13.38'W	62		

NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L101
REFERENCE NO.: 91-70-003
DATE/TIME : 14/09/91 19:14 UTC
POSITION : 69-17.7N 137-51.7W

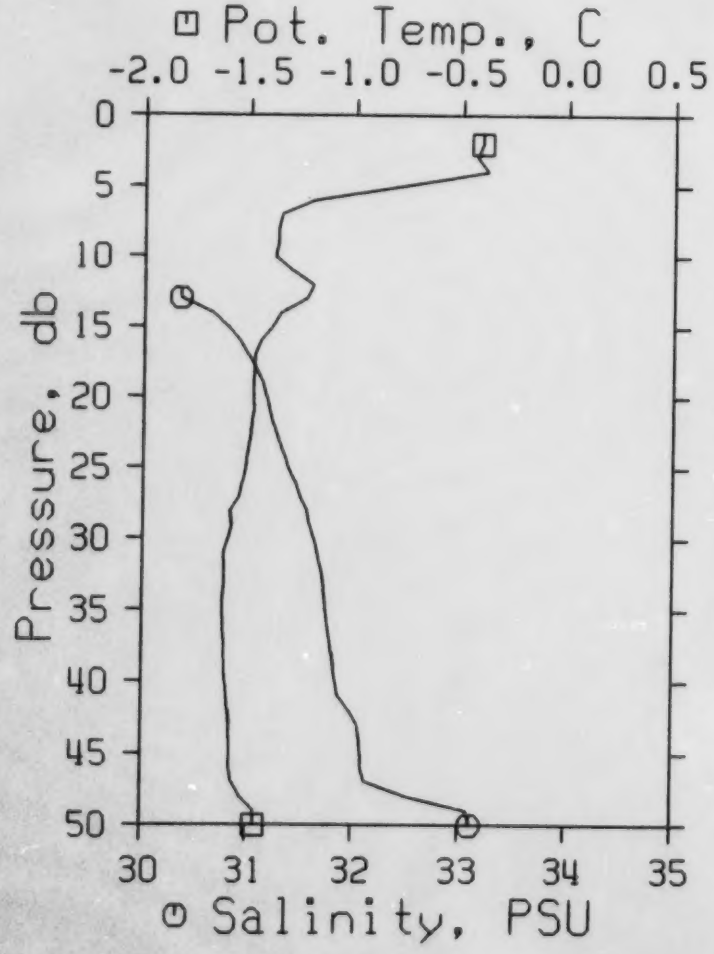
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	3.031	3.031	7.787	6.23	2116.8	.00	.00	1427
5	5	-.158	-.158	24.904	20.00	776.5	.83	.02	1435
5	5	-.710	-.710	27.589	22.17	567.2	.85	.02	1436
10	10	-1.411	-1.411	30.516	24.56	339.6	1.05	.03	1437
20	20	-1.543	-1.543	31.362	25.24	274.0	1.35	.08	1437
30	30	-1.588	-1.588	31.875	25.66	234.3	1.61	.14	1438
36	36	-1.589	-1.590	31.906	25.69	231.9	1.75	.19	1438

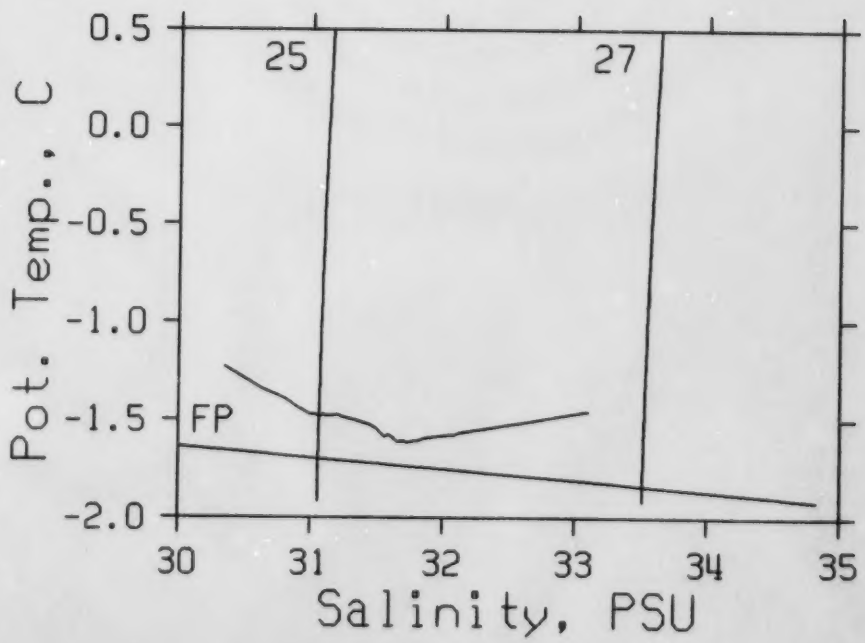




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L102
REFERENCE NO.: 91-70-004
DATE/TIME : 14/09/91 20:07 UTC
POSITION : 69-25.6N 137-59.8W

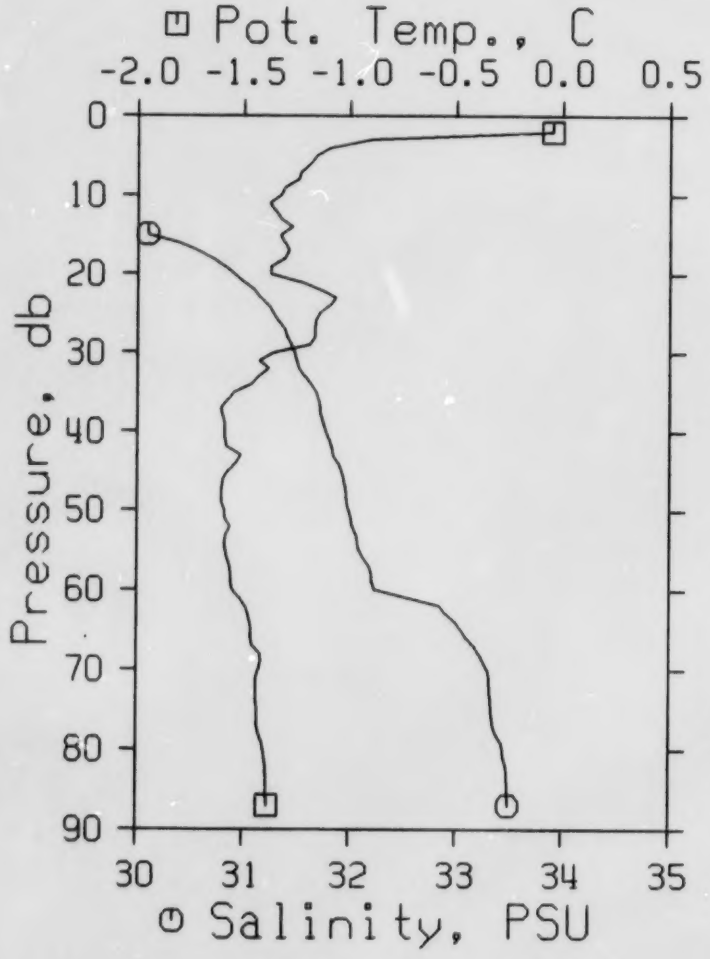
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.410	-.410	22.916	18.39	930.2	.00	.00	1431
5	5	-.652	-.652	24.904	20.00	775.5	.42	.01	1433
5	5	-.786	-.786	25.438	20.43	733.8	.44	.01	1433
10	10	-1.378	-1.378	29.090	23.40	450.0	.71	.03	1435
20	20	-1.477	-1.477	31.173	25.09	288.7	1.05	.08	1437
30	30	-1.591	-1.591	31.631	25.46	253.1	1.32	.15	1438
50	49	-1.459	-1.460	33.111	26.66	139.3	1.77	.33	1441

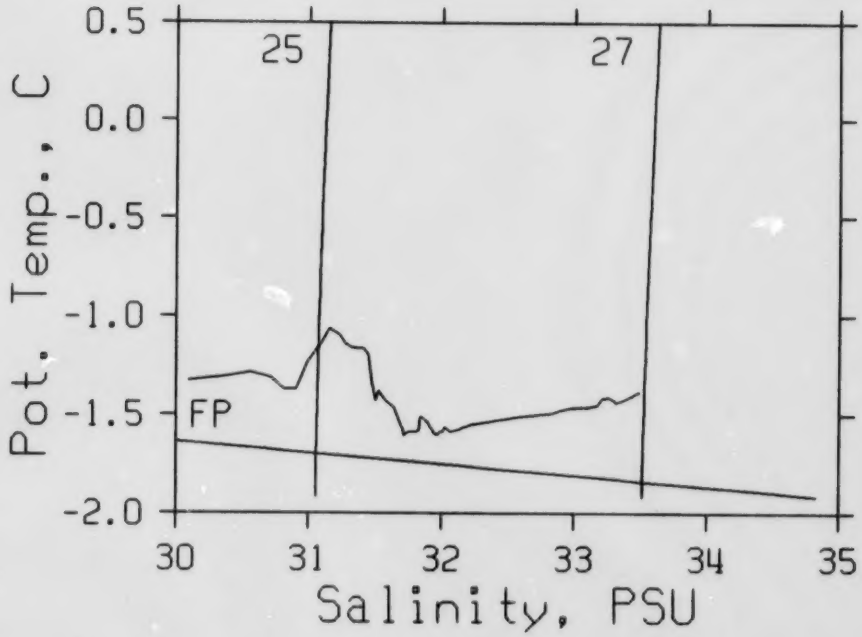




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L103
REFERENCE NO.: 91-70-005
DATE/TIME : 14/09/91 21:55 UTC
POSITION : 69-31.4N 138- 5.8W

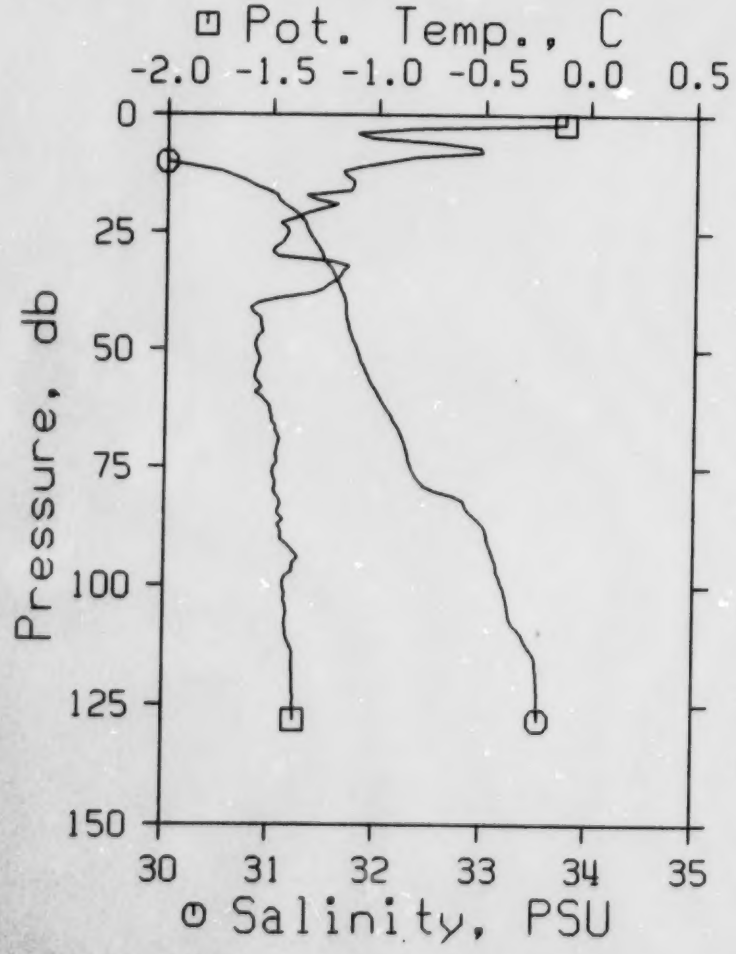
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.759	.759	15.142	12.13	1537.8	.00	.00	1426
4	4	-1.076	-1.076	24.899	20.00	775.5	.47	.01	1431
5	5	-1.156	-1.156	25.556	20.53	724.4	.55	.01	1431
10	10	-1.327	-1.327	28.342	22.79	508.0	.86	.03	1434
20	20	-1.372	-1.372	30.910	24.87	309.2	1.24	.09	1438
30	30	-1.356	-1.357	31.481	25.34	265.2	1.53	.16	1439
50	49	-1.586	-1.587	31.990	25.75	225.4	2.01	.36	1438
75	74	-1.431	-1.433	33.337	26.84	121.9	2.44	.62	1441
87	86	-1.384	-1.386	33.498	26.97	109.7	2.57	.73	1442

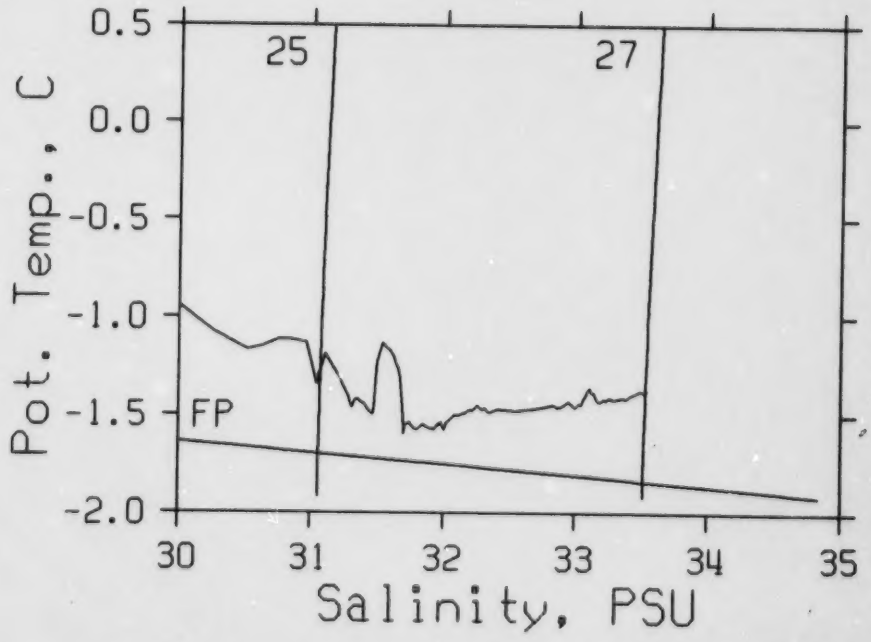




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L104
REFERENCE NO.: 91-70-006
DATE/TIME : 14/09/91 23:17 UTC
POSITION : 69-38.0N 138-14.1W

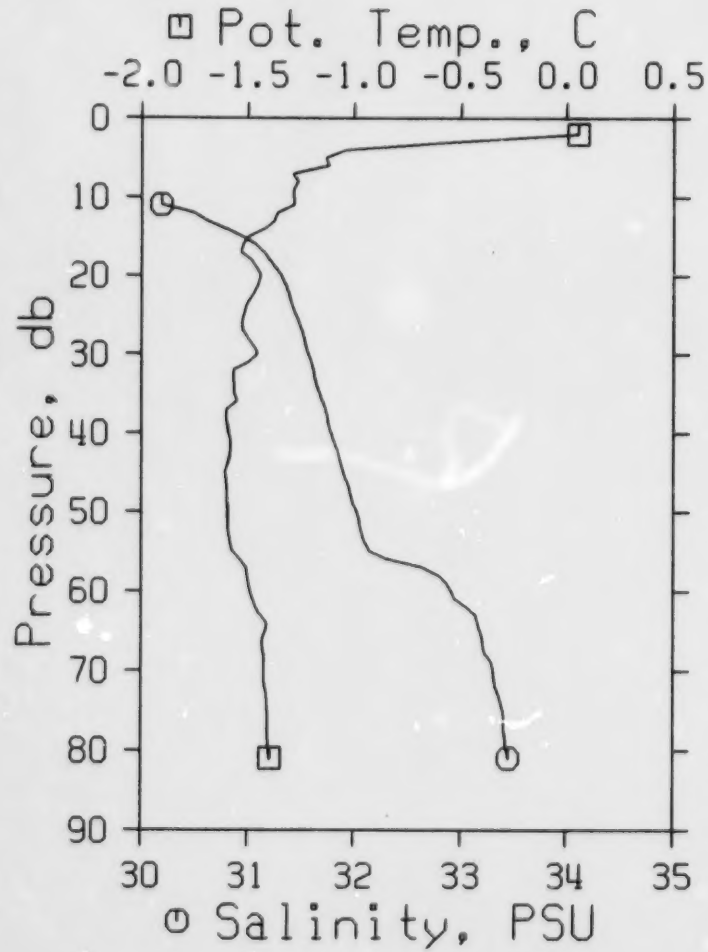
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	1.239	1.239	14.141	11.33	1616.3	.00	.00	1427
3	3	-.929	-.929	24.900	20.00	775.5	.42	.01	1431
5	5	-1.031	-1.031	26.426	21.24	656.9	.54	.01	1433
10	10	-.945	-.945	30.000	24.13	380.4	.79	.03	1438
20	20	-1.269	-1.269	31.179	25.09	288.7	1.10	.08	1438
30	30	-1.469	-1.469	31.480	25.34	265.0	1.38	.15	1438
50	49	-1.564	-1.565	31.815	25.61	238.9	1.88	.35	1438
75	74	-1.483	-1.484	32.332	26.03	199.2	2.42	.69	1440
100	99	-1.429	-1.431	33.195	26.73	132.9	2.81	1.04	1442
125	124	-1.375	-1.378	33.544	27.01	106.1	3.10	1.37	1443
128	127	-1.373	-1.376	33.545	27.01	106.1	3.13	1.41	1443

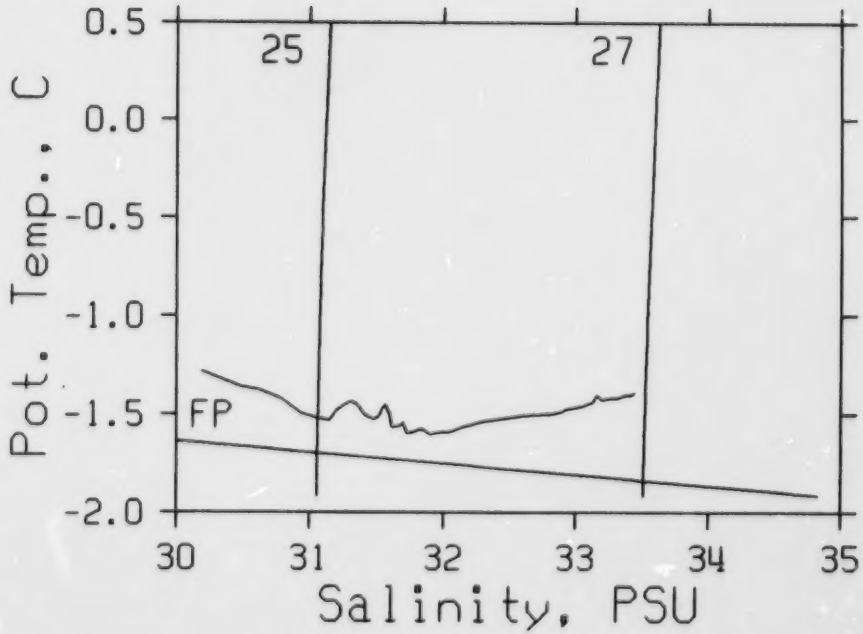




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L105
REFERENCE NO.: 91-70-007
DATE/TIME : 15/09/91 01:15 UTC
POSITION : 69-30.0N 138-18.1W

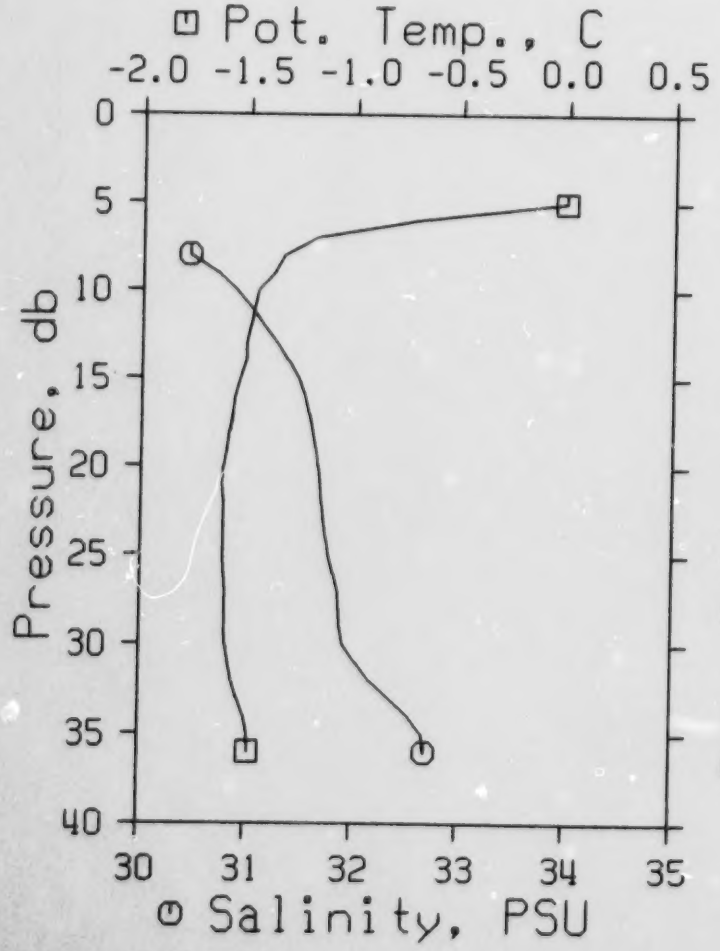
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	1.842	1.842	12.497	10.01	1745.6	.00	.00	1428
4	4	-1.014	-1.014	24.900	20.00	775.5	.49	.01	1431
5	5	-1.134	-1.134	26.417	21.23	657.5	.57	.01	1432
10	10	-1.285	-1.285	29.882	24.04	388.8	.82	.03	1436
20	20	-1.439	-1.439	31.315	25.20	277.8	1.13	.08	1438
30	30	-1.452	-1.453	31.568	25.41	258.2	1.40	.15	1438
50	49	-1.592	-1.593	32.027	25.78	222.5	1.88	.34	1438
75	74	-1.402	-1.404	33.400	26.90	117.1	2.28	.58	1442
81	80	-1.392	-1.394	33.454	26.94	113.0	2.34	.64	1442

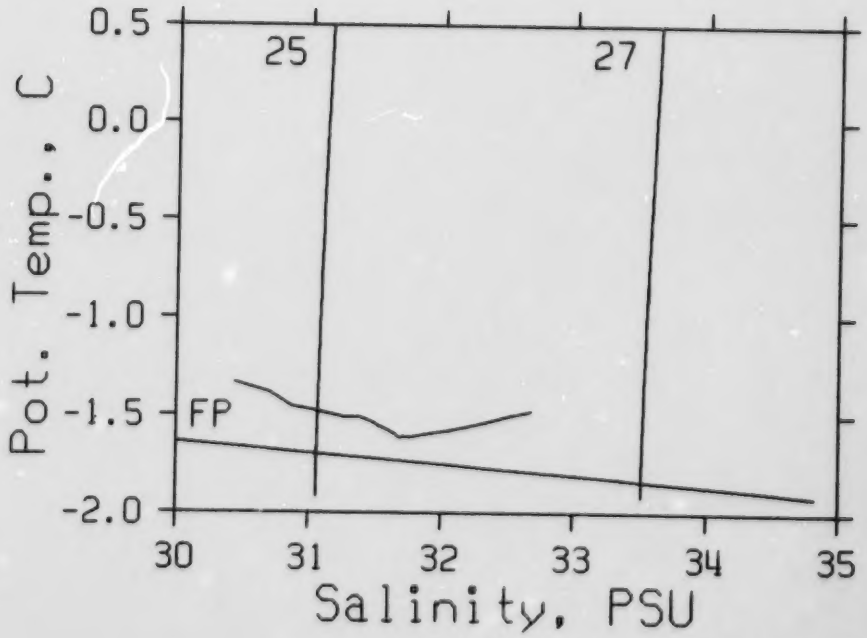




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L106
REFERENCE NO.: 91-70-008
DATE/TIME : 15/09/91 02:26 UTC
POSITION : 69-22.2N 138-18.4W

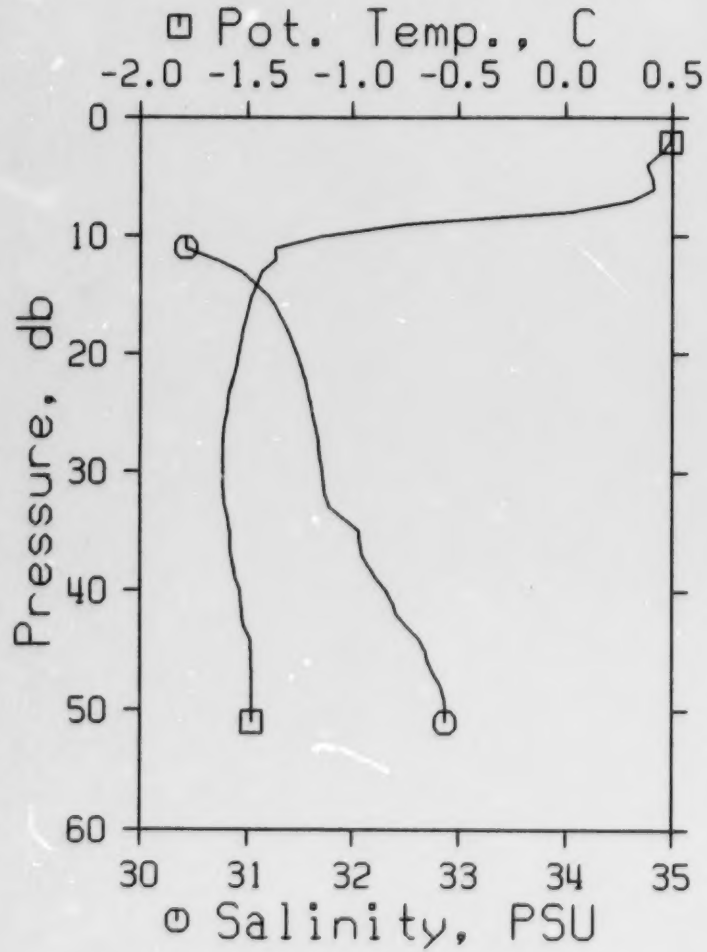
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	2.385	2.385	11.936	9.55	1790.1	.00	.00	1430
5	5	.118	.118	24.918	20.00	775.8	.76	.02	1436
5	5	-.010	-.010	25.643	20.58	719.3	.77	.02	1437
10	10	-1.457	-1.457	30.875	24.85	311.8	.97	.03	1437
20	20	-1.610	-1.610	31.668	25.49	250.2	1.25	.07	1437
30	30	-1.593	-1.593	31.916	25.69	231.1	1.49	.13	1438
36	36	-1.481	-1.482	32.693	26.32	171.4	1.61	.17	1440

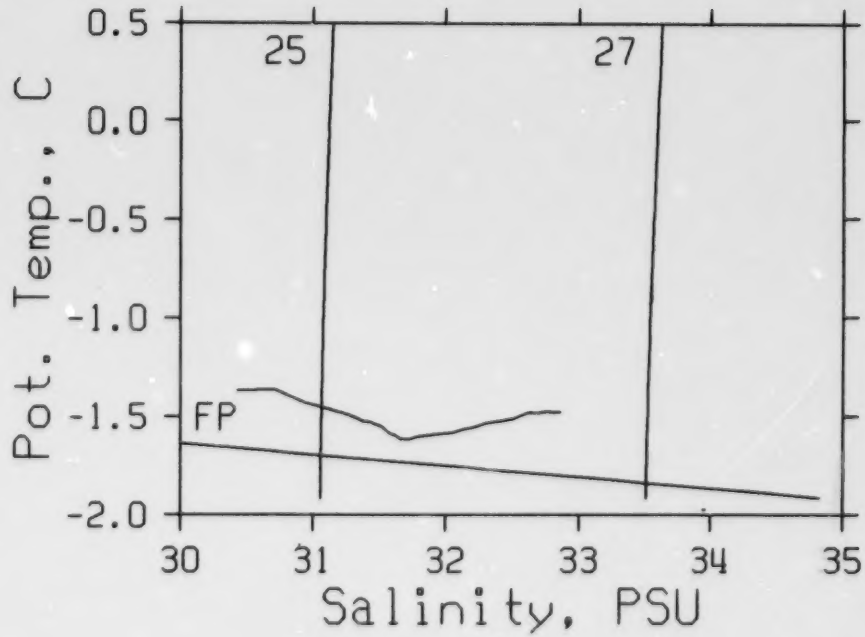




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L107
REFERENCE NO.: 91-70-009
DATE/TIME : 15/09/91 03:01 UTC
POSITION : 69-23.1N 138-10.0W

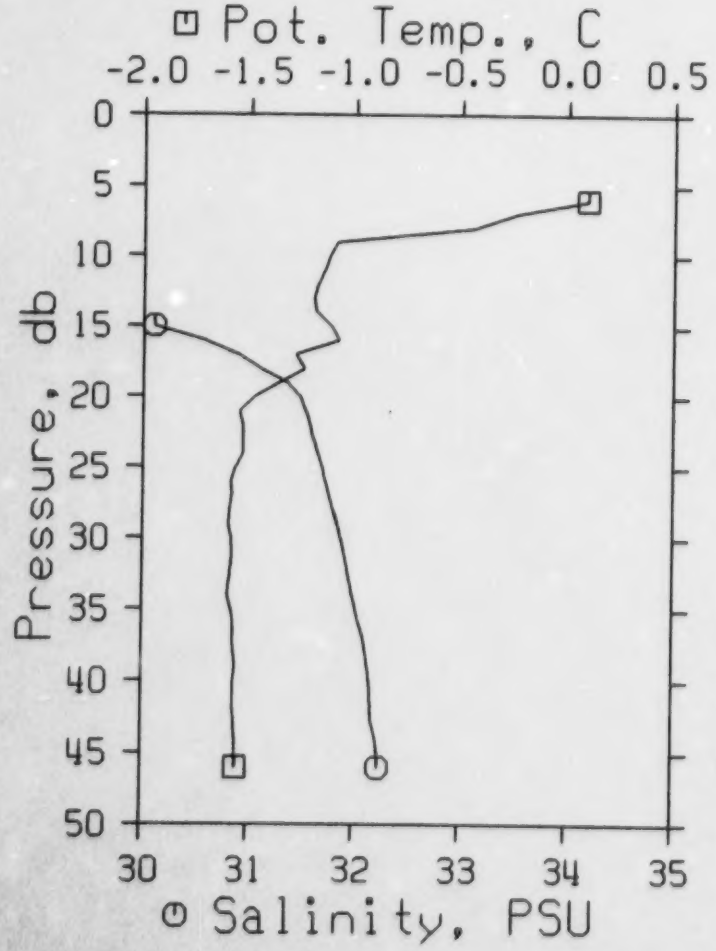
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.933	.933	19.652	15.75	1185.8	.00	.00	1433
5	5	.406	.406	23.427	18.79	891.7	.49	.01	1436
7	7	.228	.227	24.923	20.00	775.5	.68	.02	1437
10	10	-1.147	-1.147	29.686	23.88	404.2	.84	.04	1437
20	20	-1.541	-1.541	31.474	25.33	265.3	1.14	.08	1437
30	30	-1.615	-1.615	31.714	25.53	246.6	1.40	.15	1438
50	49	-1.478	-1.479	32.871	26.47	157.7	1.80	.31	1440
51	50	-1.478	-1.479	32.872	26.47	157.6	1.81	.32	1440

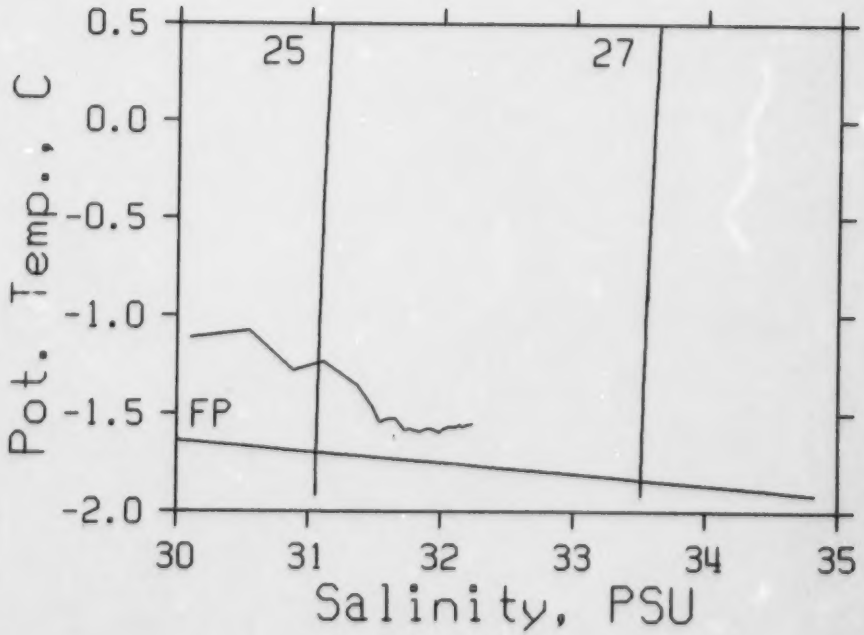




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L108
REFERENCE NO.: 91-70-010
DATE/TIME : 15/09/91 04:17 UTC
POSITION : 69-27.3N 137-41.8W

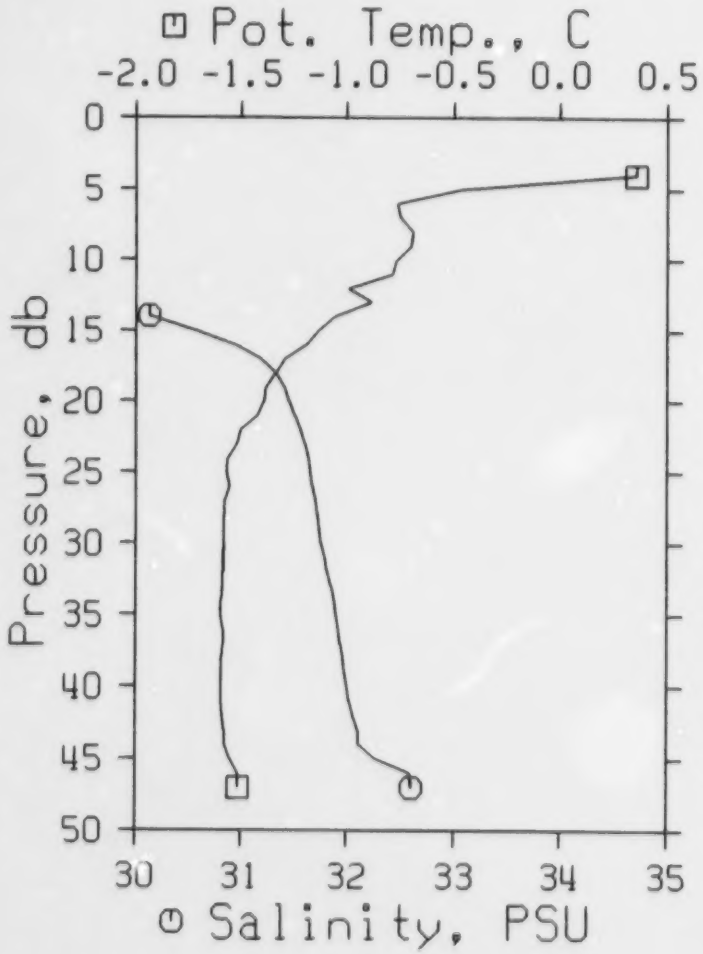
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.980	.980	18.398	14.74	1283.5	.00	.00	1432
5	5	.534	.534	19.499	15.63	1197.1	.63	.02	1431
9	9	-1.013	-1.014	24.900	20.00	775.5	1.02	.04	1431
10	10	-1.123	-1.123	26.560	21.34	646.4	1.10	.05	1433
20	20	-1.470	-1.470	31.486	25.34	264.5	1.50	.11	1438
30	30	-1.579	-1.579	31.879	25.67	234.0	1.75	.17	1438
50	49	-1.547	-1.547	32.309	26.01	200.9	2.17	.34	1439

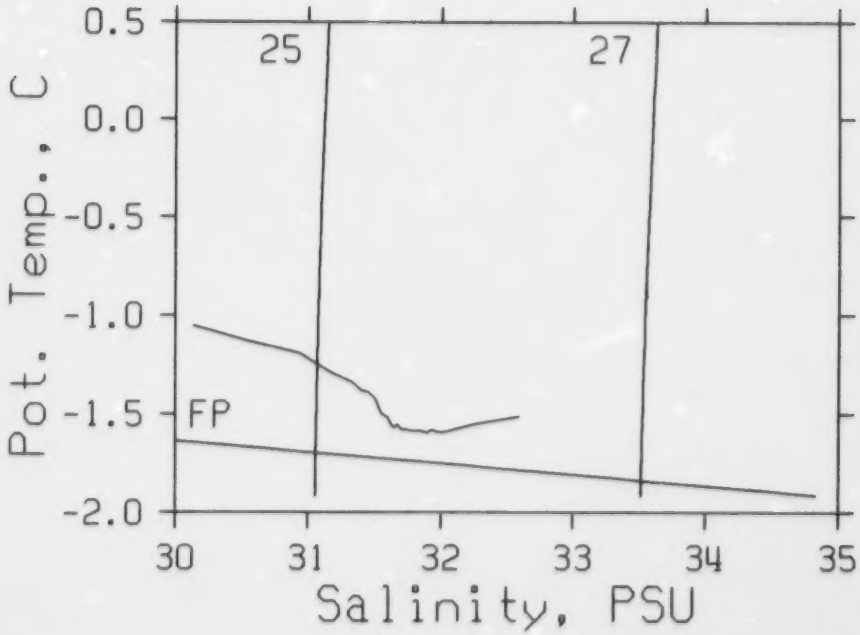




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L109
REFERENCE NO.: 91-70-011
DATE/TIME : 15/09/91 05:15 UTC
POSITION : 69-30.0N 137-21.7W

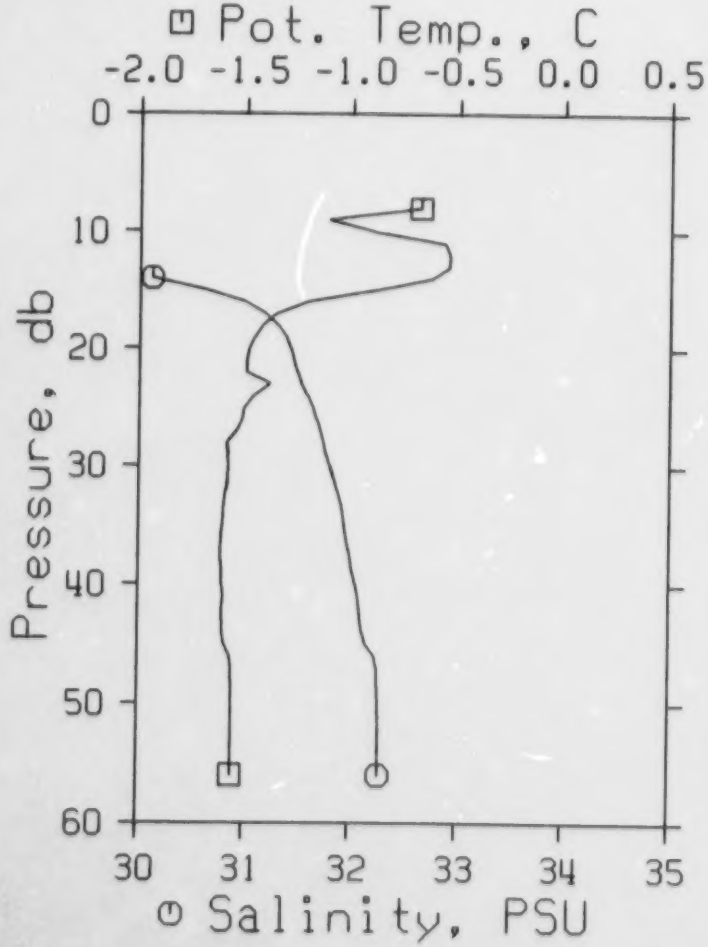
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	1.282	1.282	17.187	13.77	1378.3	.00	.00	1431
5	5	-.466	-.466	23.907	19.19	853.1	.62	.01	1432
6	6	-.709	-.709	24.903	20.00	775.5	.68	.02	1432
10	10	-.769	-.769	25.308	20.33	744.0	1.00	.04	1433
20	20	-1.390	-1.390	31.454	25.32	267.2	1.41	.10	1438
30	30	-1.582	-1.582	31.759	25.57	243.2	1.66	.17	1438
50	49	-1.497	-1.498	32.704	26.33	170.5	2.09	.34	1440

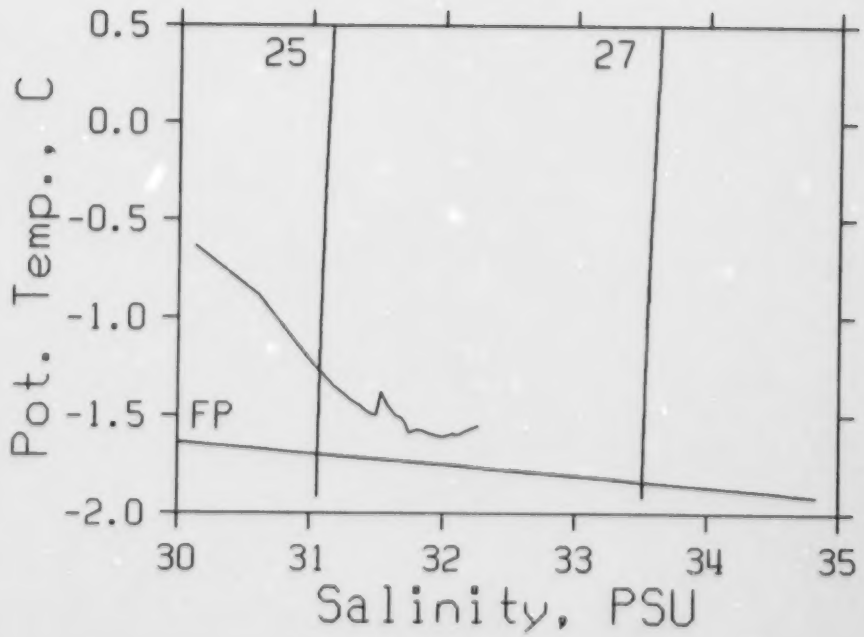




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L110
REFERENCE NO.: 91-70-012
DATE/TIME : 15/09/91 14:44 UTC
POSITION : 69-32.2N 137-48.2W

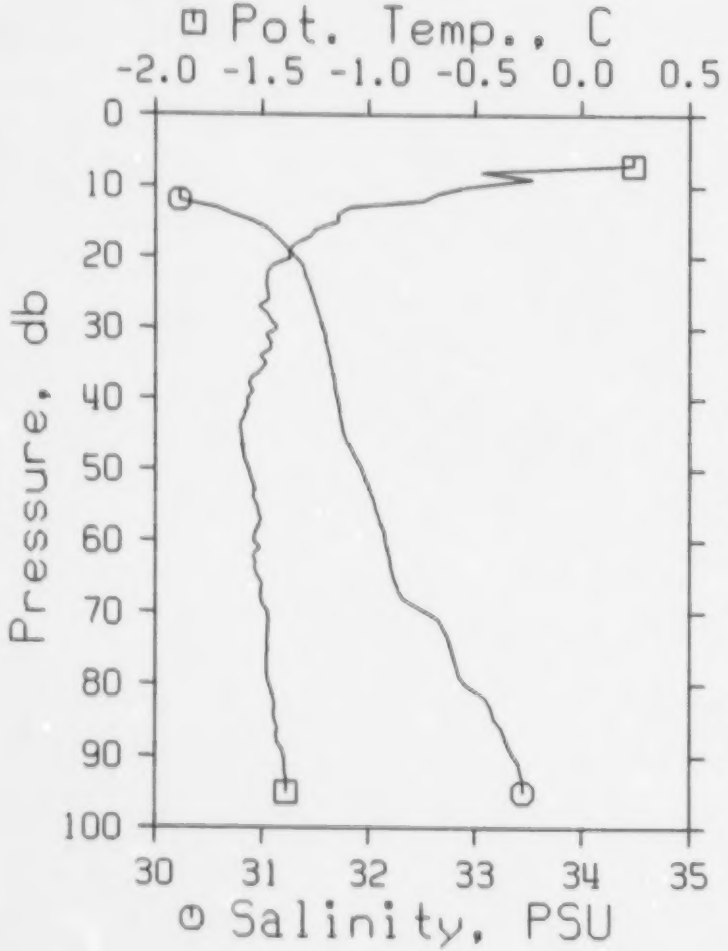
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	1.326	1.326	16.856	13.50	1404.1	.00	.00	1431
5	5	1.331	1.331	16.808	13.46	1407.9	.70	.02	1431
8	8	-.878	-.878	24.900	20.00	775.6	1.13	.05	1432
10	10	-.888	-.888	27.252	21.90	593.0	1.23	.06	1435
20	20	-1.481	-1.481	31.429	25.30	268.9	1.60	.11	1438
30	30	-1.574	-1.574	31.804	25.60	239.8	1.86	.17	1438
50	49	-1.553	-1.554	32.270	25.98	203.9	2.30	.35	1439
56	55	-1.552	-1.553	32.274	25.99	203.6	2.42	.42	1439

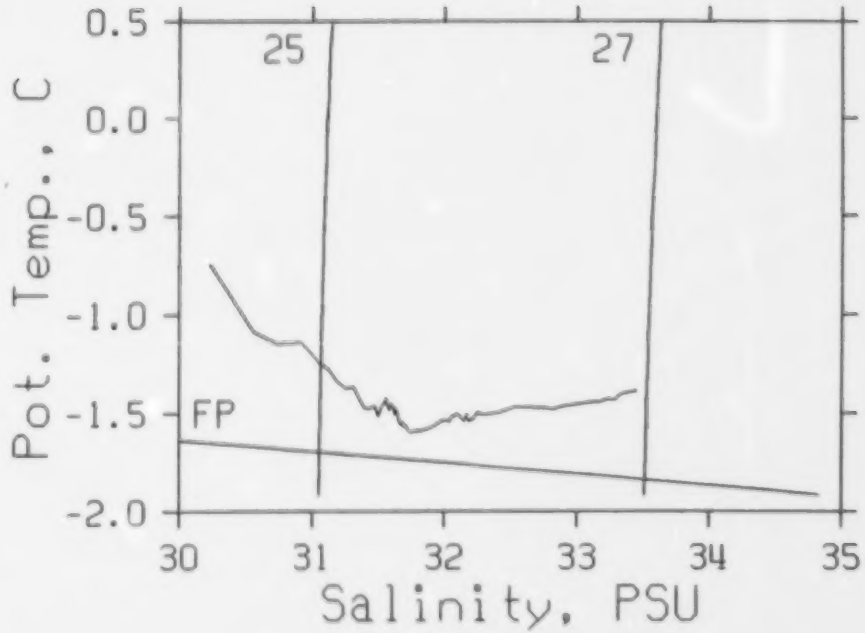




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L111
REFERENCE NO.: 91-70-013
DATE/TIME : 15/09/91 15:32 UTC
POSITION : 69-39.9N 137-54.2W

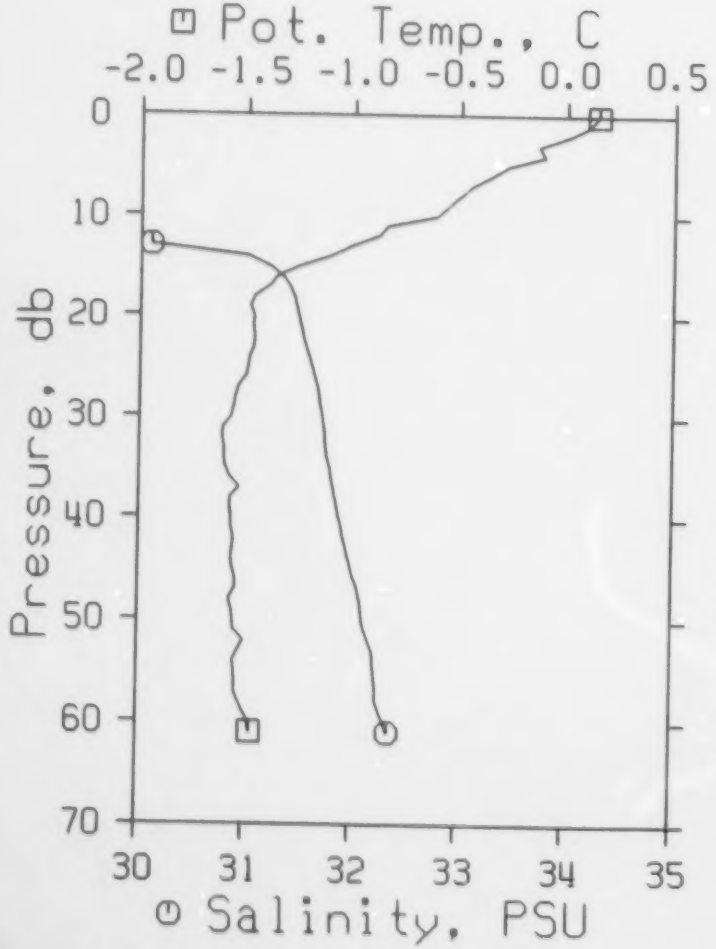
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.642	.642	15.270	12.23	1527.7	.00	.00	1426
5	5	.642	.642	15.264	12.23	1528.2	.76	.02	1426
9	9	-.283	-.283	24.911	20.00	775.5	1.24	.05	1434
10	10	-.534	-.534	27.914	22.43	542.5	1.32	.06	1437
20	20	-1.369	-1.369	31.315	25.20	278.0	1.65	.11	1438
30	30	-1.428	-1.429	31.563	25.41	258.7	1.92	.18	1438
50	49	-1.563	-1.564	31.930	25.71	230.1	2.41	.38	1438
75	74	-1.473	-1.474	32.773	26.39	165.3	2.92	.70	1440
100	99	-1.348	-1.350	33.607	27.06	101.4	3.24	.98	1443

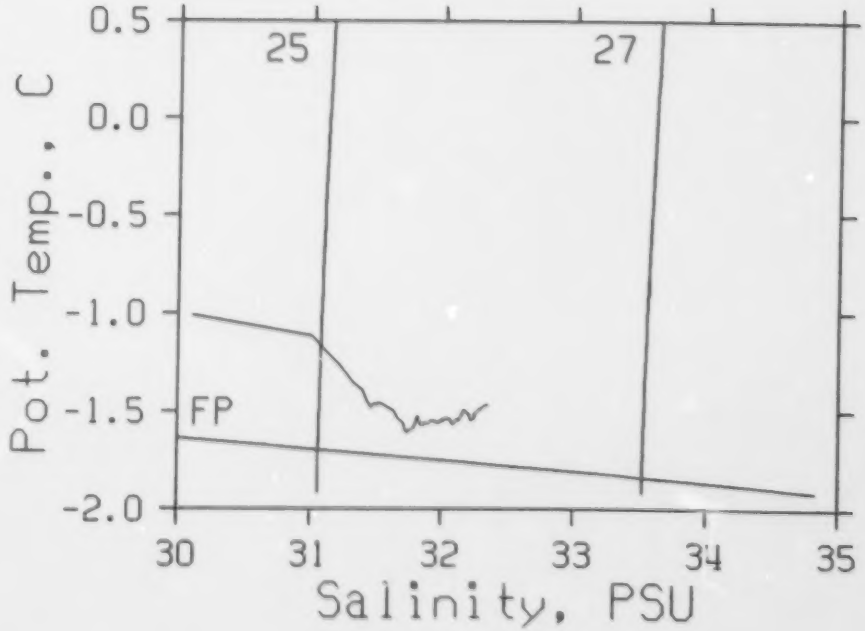




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L112
REFERENCE NO.: 91-70-014
DATE/TIME : 15/09/91 16:41 UTC
POSITION : 69-42.2N 137-37.7W

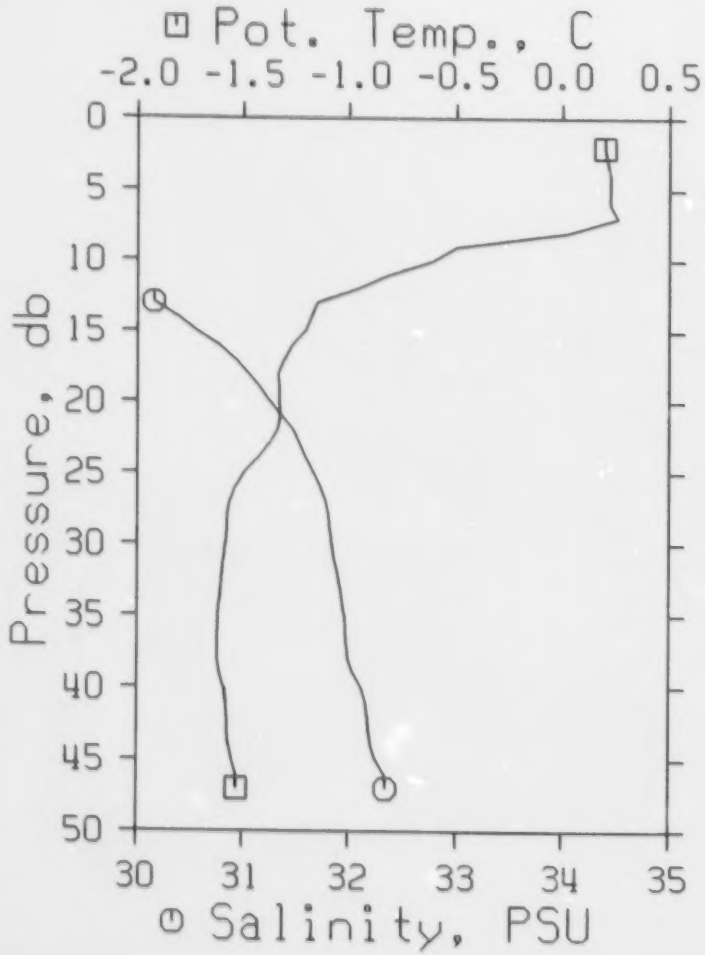
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.145	.145	19.322	15.49	1210.6	.00	.00	1429
5	5	-.277	-.277	22.664	18.19	949.9	.55	.01	1431
8	8	-.525	-.525	24.906	20.00	775.5	.83	.03	1433
10	10	-.609	-.609	25.760	20.69	709.1	.96	.04	1434
20	20	-1.464	-1.464	31.485	25.34	264.6	1.31	.09	1438
30	30	-1.565	-1.565	31.715	25.53	246.7	1.57	.16	1438
50	49	-1.547	-1.548	32.111	25.85	216.1	2.03	.35	1439
61	60	-1.465	-1.466	32.362	26.05	197.0	2.26	.48	1440

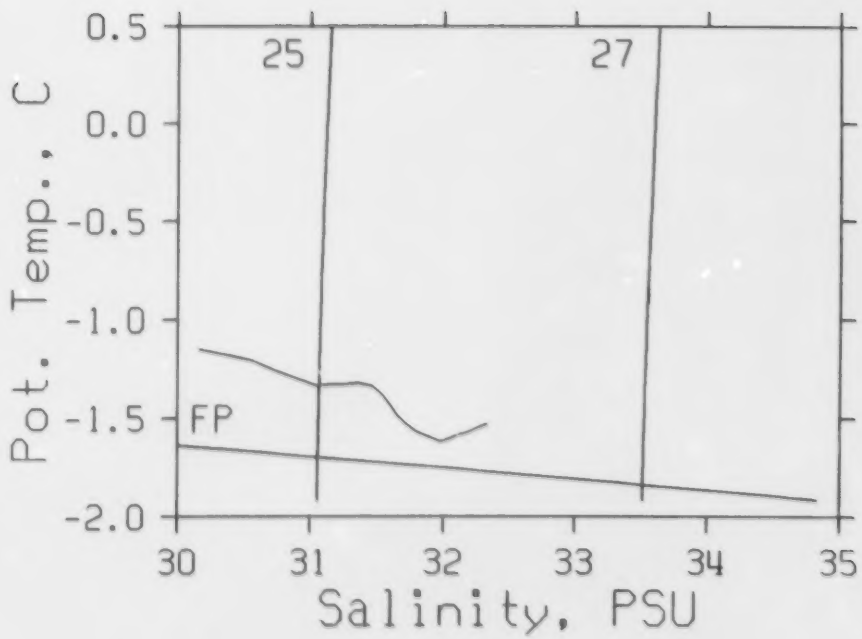




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L113
REFERENCE NO.: 91-70-016
DATE/TIME : 15/09/91 17:47 UTC
POSITION : 69-45.3N 137-14.6W

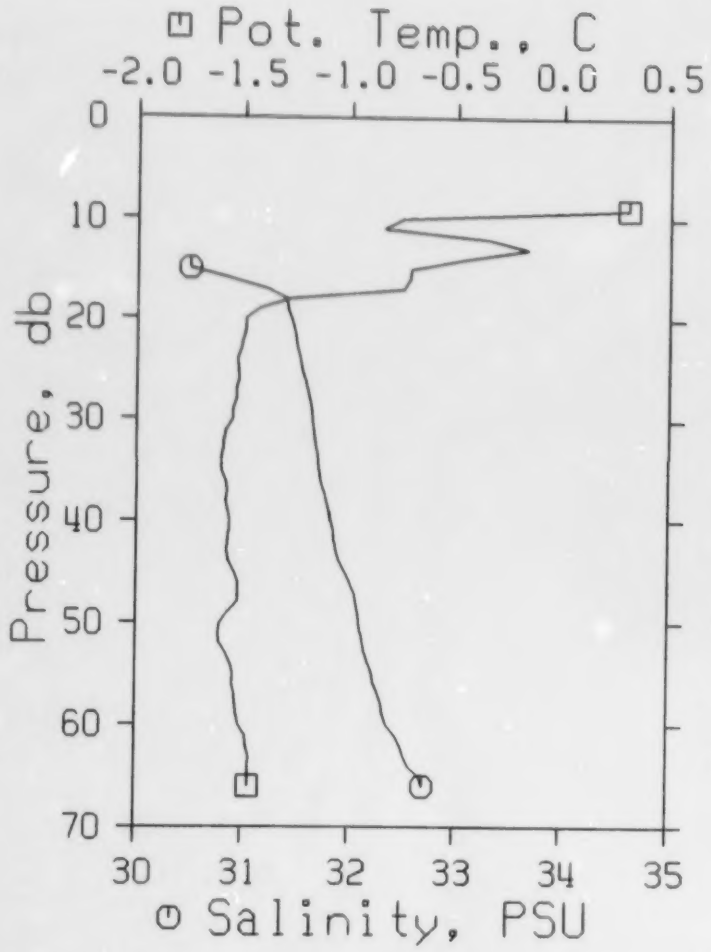
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.198	.198	16.462	13.19	1434.4	.00	.00	1425
5	5	.224	.224	16.111	12.91	1461.9	.72	.02	1425
10	10	-.614	-.614	24.707	19.84	790.8	1.34	.06	1433
10	10	-.626	-.626	24.904	20.00	775.5	1.35	.06	1433
20	20	-1.329	-1.329	31.259	25.16	282.4	1.72	.12	1438
30	30	-1.580	-1.580	31.840	25.63	237.0	1.97	.18	1438
50	49	-1.497	-1.497	32.461	26.14	189.3	2.40	.36	1440

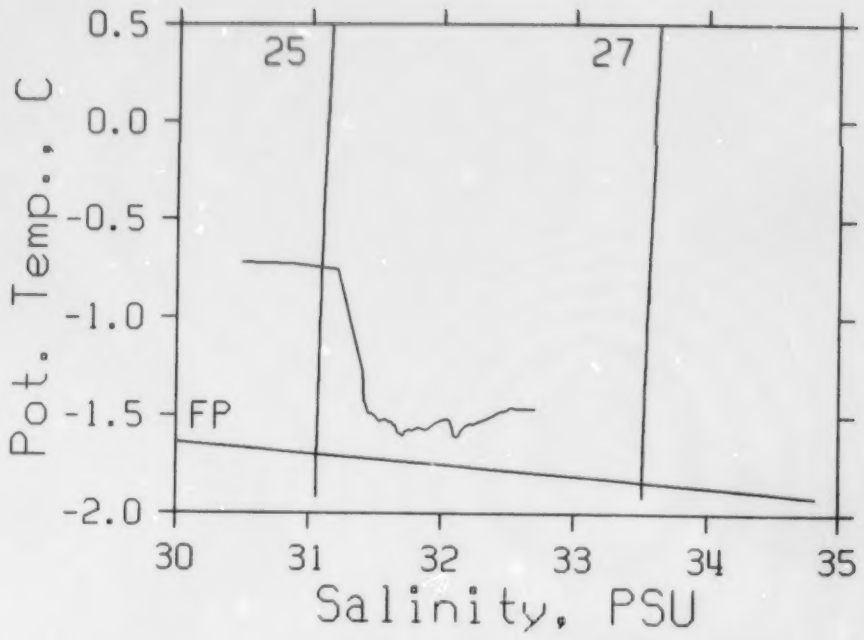




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L114
REFERENCE NO.: 91-70-017
DATE/TIME : 15/09/91 19:27 UTC
POSITION : 69-48.4N 137-37.6W

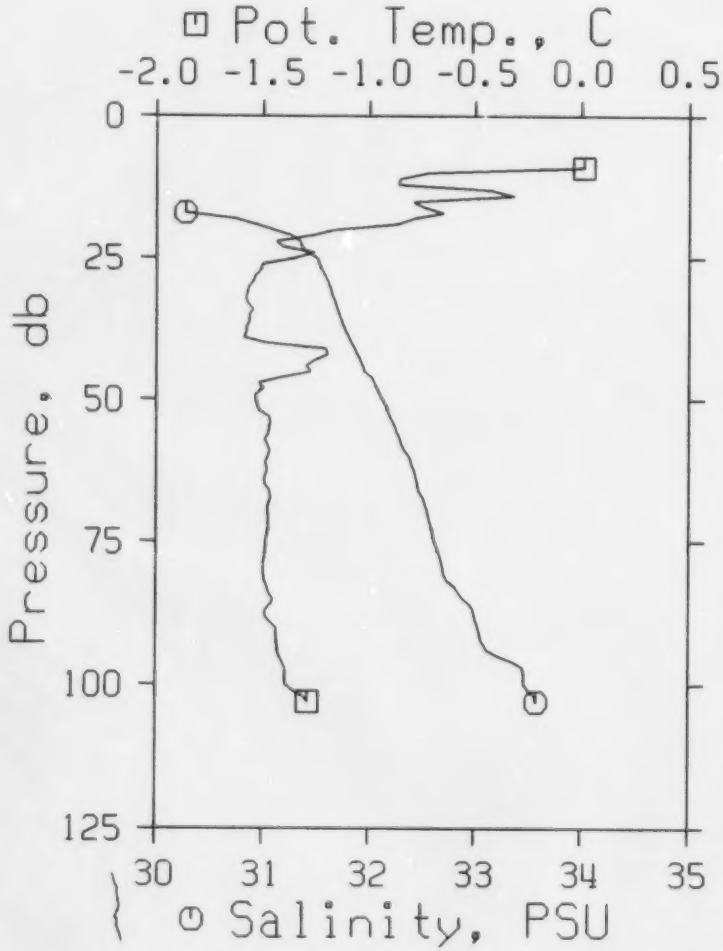
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.949	.949	18.264	14.64	1293.9	.00	.00	1431
5	5	.954	.954	18.283	14.65	1292.4	.65	.02	1431
10	10	-.757	-.757	23.815	19.12	860.0	1.25	.06	1431
11	10	-.803	-.804	24.902	20.00	775.5	1.29	.07	1432
20	20	-1.489	-1.489	31.446	25.31	267.6	1.67	.12	1438
30	30	-1.547	-1.547	31.649	25.48	251.8	1.93	.19	1438
50	49	-1.601	-1.602	32.092	25.84	217.5	2.41	.38	1439
66	65	-1.465	-1.466	32.711	26.34	170.1	2.72	.56	1440

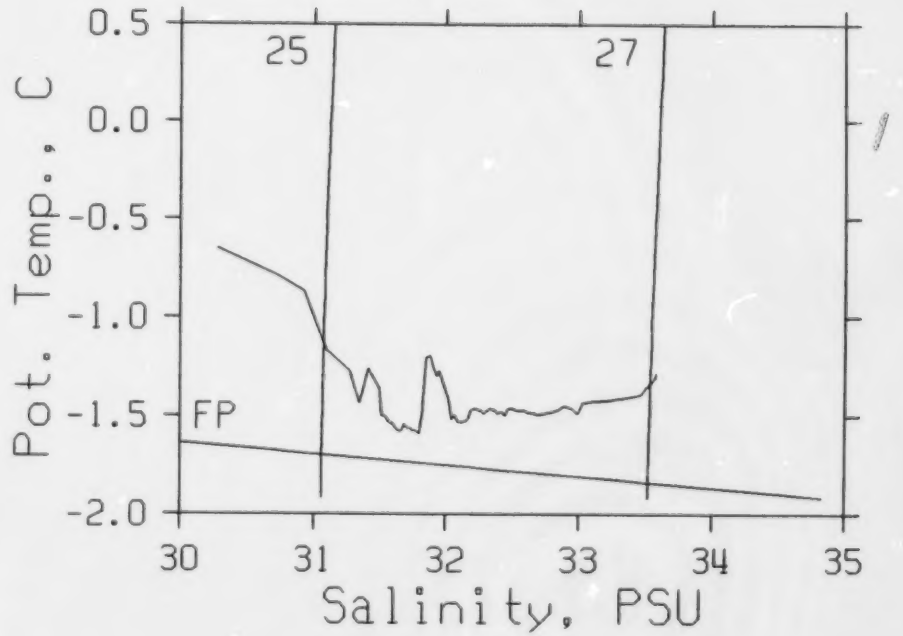




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L115
REFERENCE NO.: 91-70-019
DATE/TIME : 15/09/91 20:00 UTC
POSITION : 69-50.0N 137-50.5W

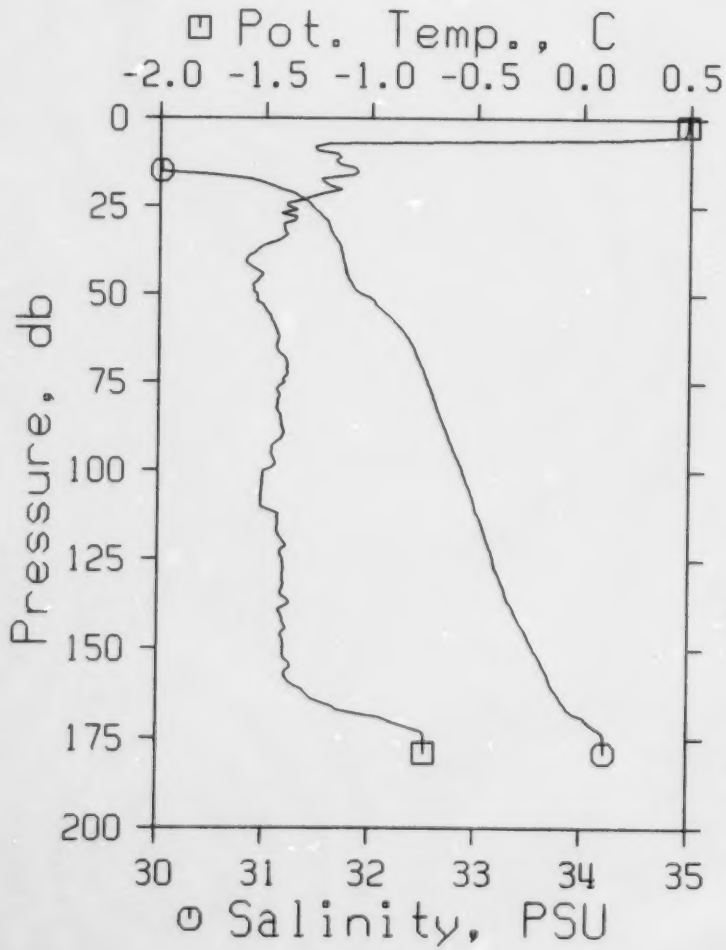
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.622	.622	16.791	13.45	1408.6	.00	.00	1428
5	5	.605	.605	16.844	13.50	1404.5	.70	.02	1428
10	10	-.722	-.722	22.955	18.43	927.0	1.36	.07	1430
11	11	-.856	-.856	24.901	20.00	775.5	1.47	.08	1432
20	20	-1.173	-1.173	31.103	25.03	294.8	1.88	.14	1439
30	30	-1.565	-1.565	31.625	25.46	253.6	2.15	.21	1438
50	49	-1.532	-1.533	32.125	25.86	215.1	2.62	.40	1439
75	74	-1.483	-1.484	32.620	26.26	177.0	3.11	.71	1440
100	99	-1.386	-1.388	33.469	26.95	111.9	3.48	1.03	1442
103	102	-1.285	-1.287	33.578	27.04	103.8	3.51	1.07	1443

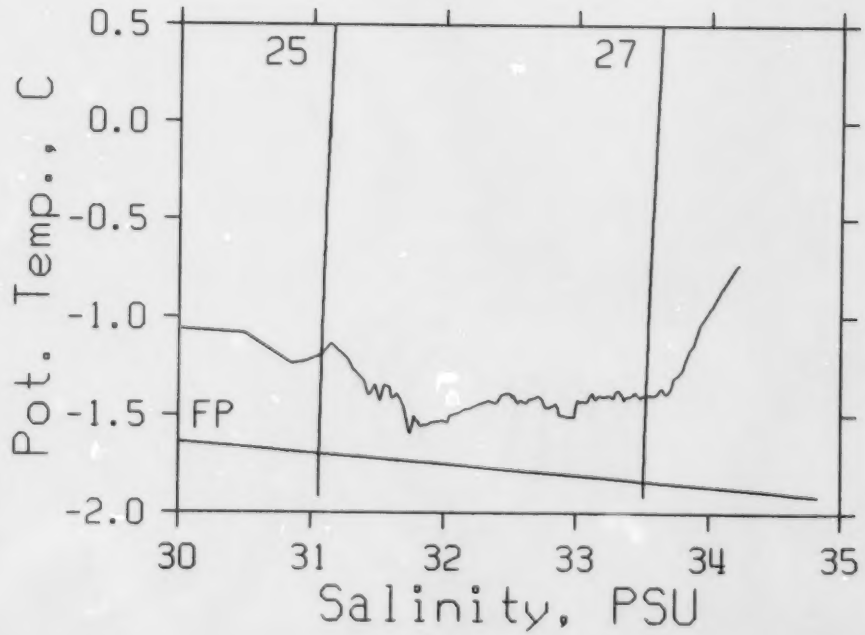




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L122
REFERENCE NO.: 91-70-020
DATE/TIME : 15/09/91 20:54 UTC
POSITION : 69-48.0N 138-22.1W

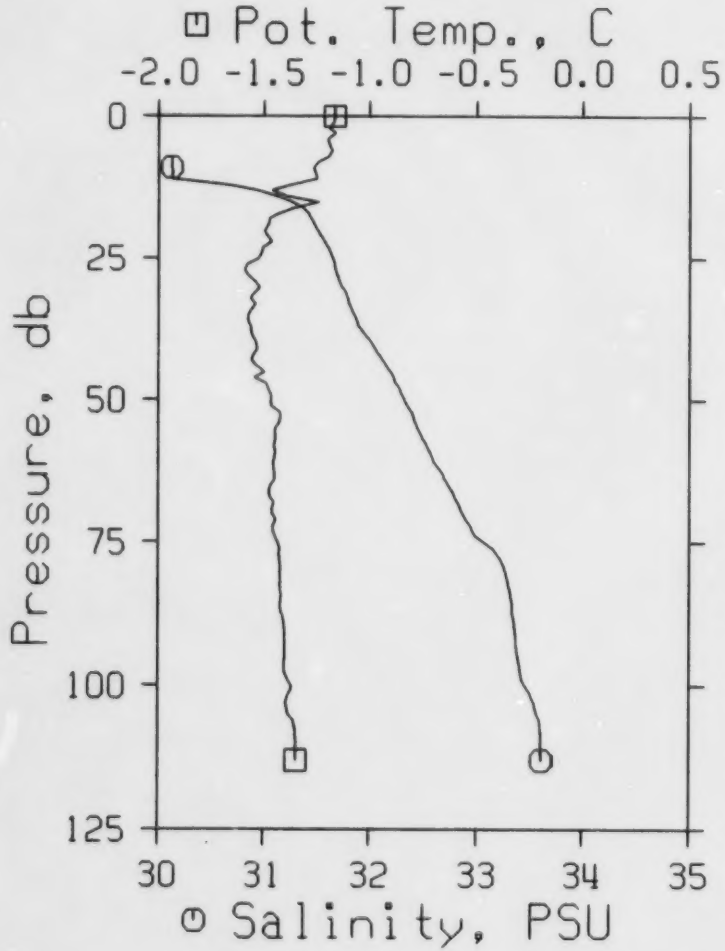
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.552	.552	14.982	12.00	1550.4	.00	.00	1425
5	5	.470	.470	15.102	12.10	1541.0	.77	.02	1425
7	7	-1.155	-1.155	24.898	20.00	775.6	1.03	.03	1430
10	10	-1.162	-1.162	28.003	22.51	534.4	1.22	.05	1434
20	20	-1.138	-1.138	31.149	25.06	291.3	1.60	.11	1439
30	30	-1.413	-1.414	31.599	25.43	255.9	1.87	.18	1438
50	49	-1.536	-1.537	31.912	25.69	231.5	2.36	.37	1439
75	74	-1.401	-1.402	32.531	26.19	184.1	2.86	.69	1440
100	99	-1.498	-1.500	32.870	26.47	157.7	3.29	1.07	1441
125	124	-1.403	-1.406	33.171	26.71	134.8	3.65	1.48	1442
150	148	-1.399	-1.402	33.553	27.02	105.4	3.95	1.90	1443
175	173	-.731	-.736	34.221	27.54	56.3	4.16	2.25	1448
179	177	-.731	-.736	34.225	27.54	56.0	4.18	2.29	1448

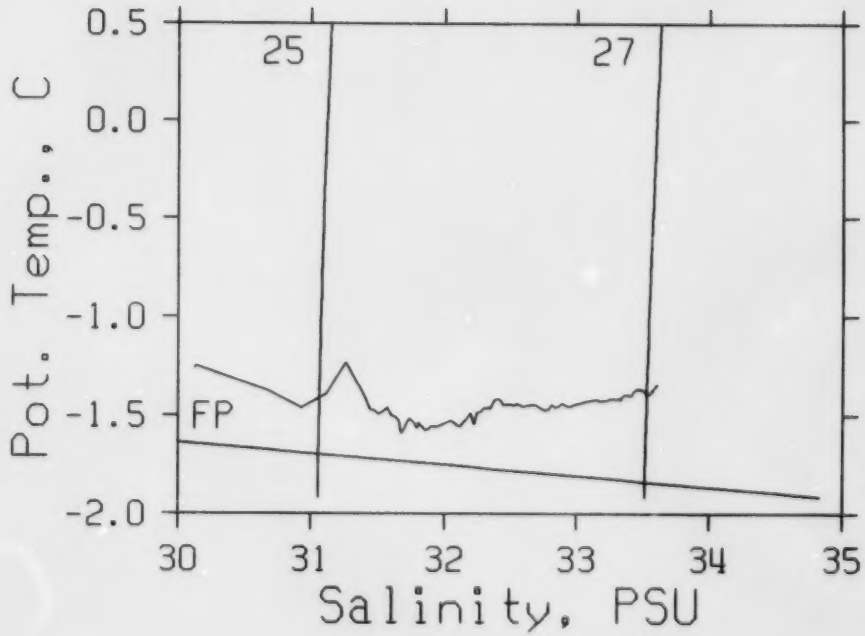




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L121
REFERENCE NO.: 91-70-022
DATE/TIME : 15/09/91 23:07 UTC
POSITION : 69-35.9N 138-31.1W

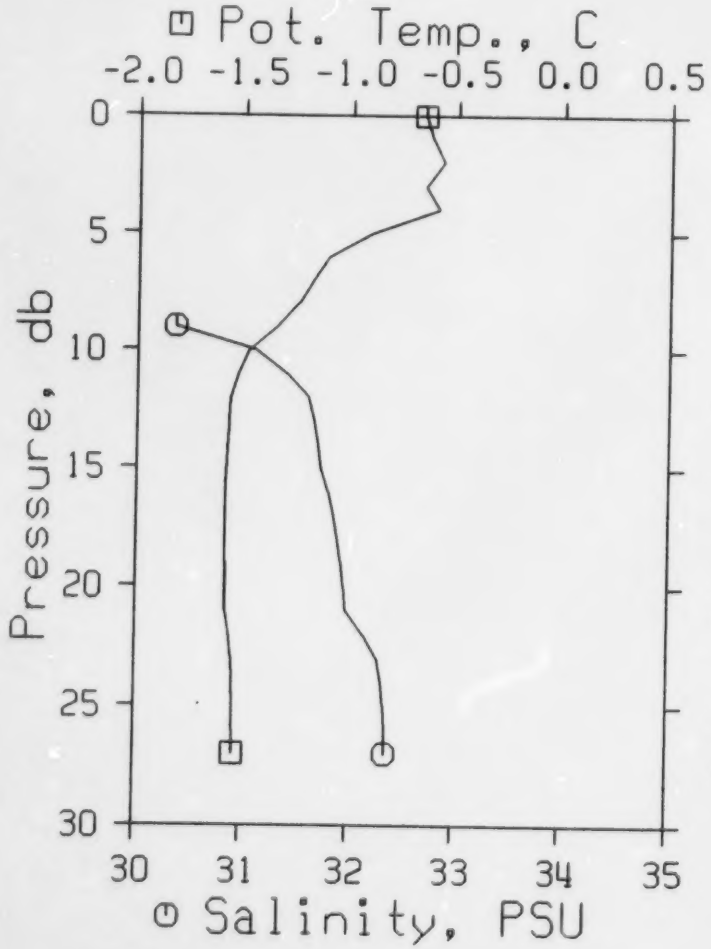
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-1.164	-1.164	29.325	23.58	432.1	.00	.00	1436
5	5	-1.189	-1.189	29.532	23.75	416.1	.21	.01	1436
10	10	-1.254	-1.254	30.140	24.25	368.9	.41	.02	1437
20	20	-1.495	-1.495	31.511	25.36	262.6	.71	.06	1438
30	30	-1.517	-1.517	31.739	25.55	244.9	.96	.13	1438
50	49	-1.462	-1.463	32.326	26.02	199.7	1.41	.31	1439
75	74	-1.430	-1.432	33.071	26.63	142.4	1.84	.58	1441
100	99	-1.365	-1.367	33.460	26.94	112.6	2.15	.85	1442
113	112	-1.342	-1.345	33.613	27.07	100.9	2.28	1.00	1443

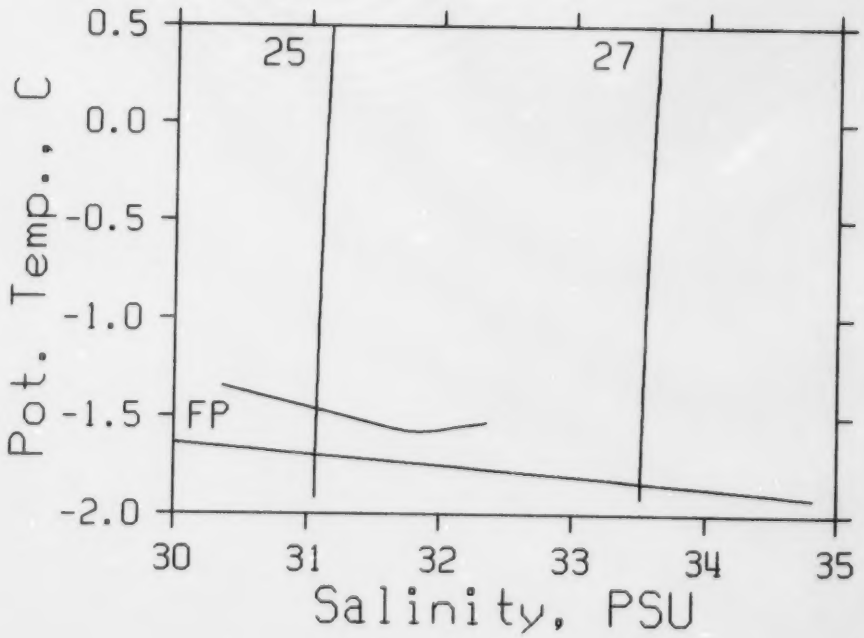




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L120
REFERENCE NO.: 91-70-023
DATE/TIME : 15/09/91 23:38 UTC
POSITION : 69-34.3N 138-42.9W

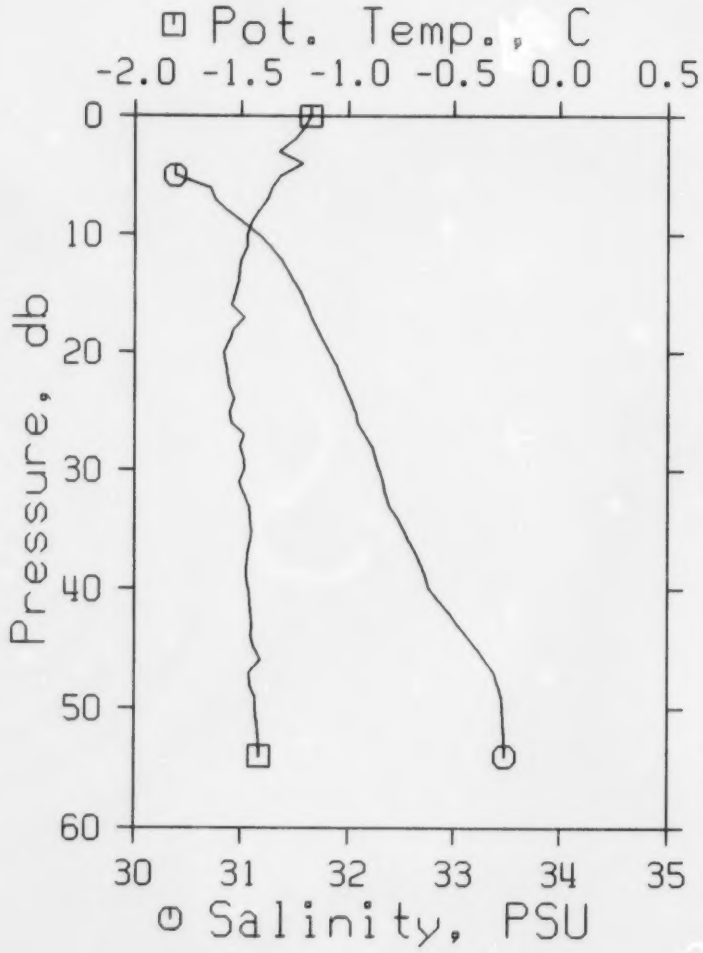
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.657	-.657	26.815	21.54	627.2	.00	.00	1435
5	5	-.909	-.909	28.004	22.51	534.8	.32	.01	1436
10	10	-1.472	-1.472	31.107	25.04	293.8	.52	.02	1437
20	20	-1.575	-1.575	31.956	25.73	228.0	.77	.06	1438
30	30	-1.505	-1.505	32.625	26.27	176.6	.97	.11	1439

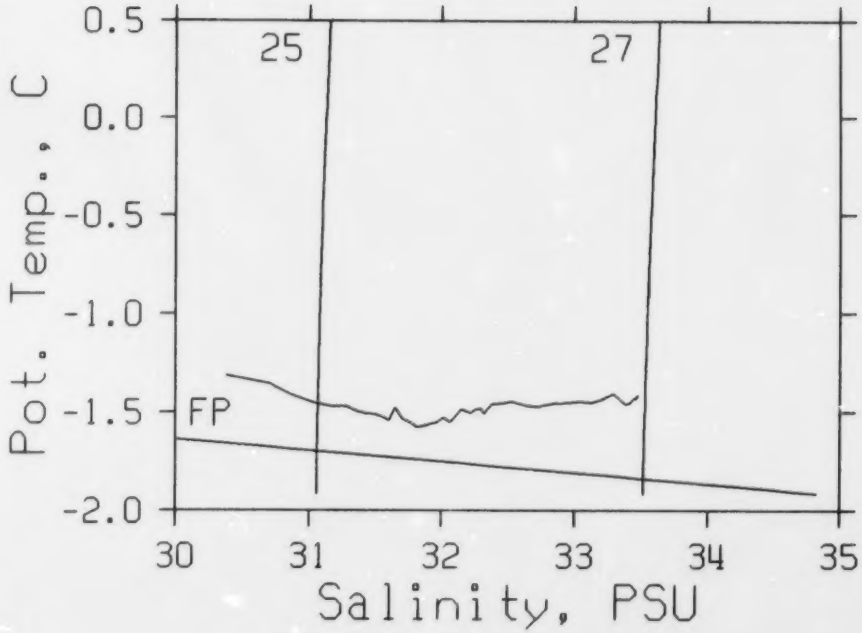




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L119
REFERENCE NO.: 91-70-024
DATE/TIME : 16/09/91 00:04 UTC
POSITION : 69-38.1N 138-45.0W

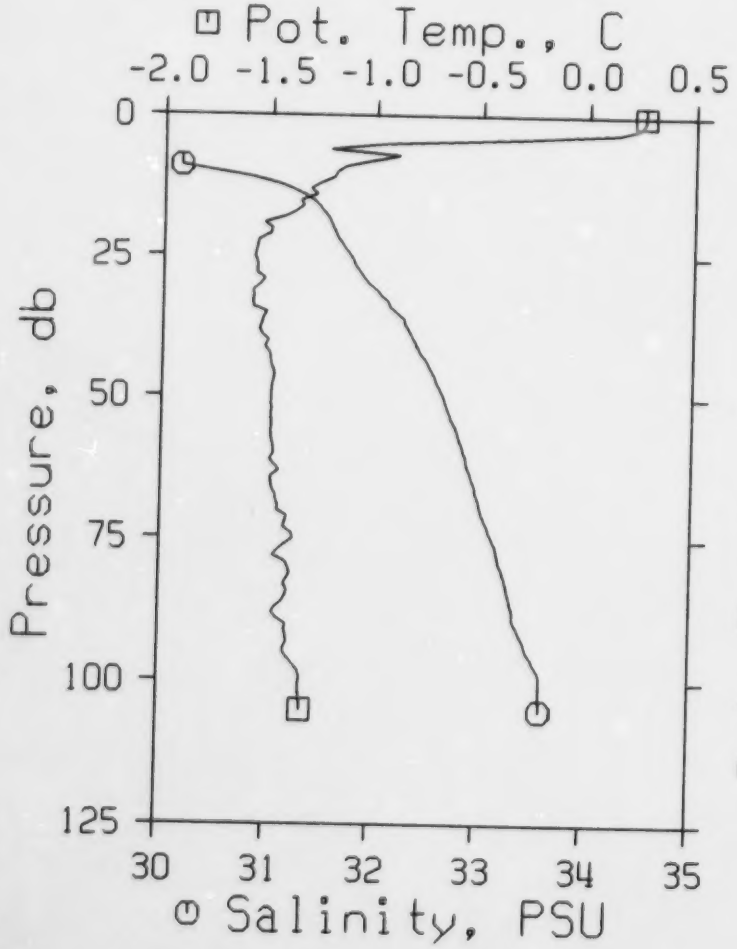
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-1.176	-1.176	28.418	22.85	502.3	.00	.00	1435
5	5	-1.313	-1.313	30.382	24.44	350.1	.22	.01	1437
10	10	-1.472	-1.472	31.167	25.08	289.2	.38	.02	1437
20	20	-1.578	-1.578	31.822	25.62	238.4	.64	.06	1438
30	30	-1.482	-1.483	32.297	26.00	201.9	.86	.11	1439
50	49	-1.430	-1.431	33.458	26.94	112.6	1.17	.24	1441
54	53	-1.412	-1.413	33.481	26.96	110.9	1.22	.26	1441

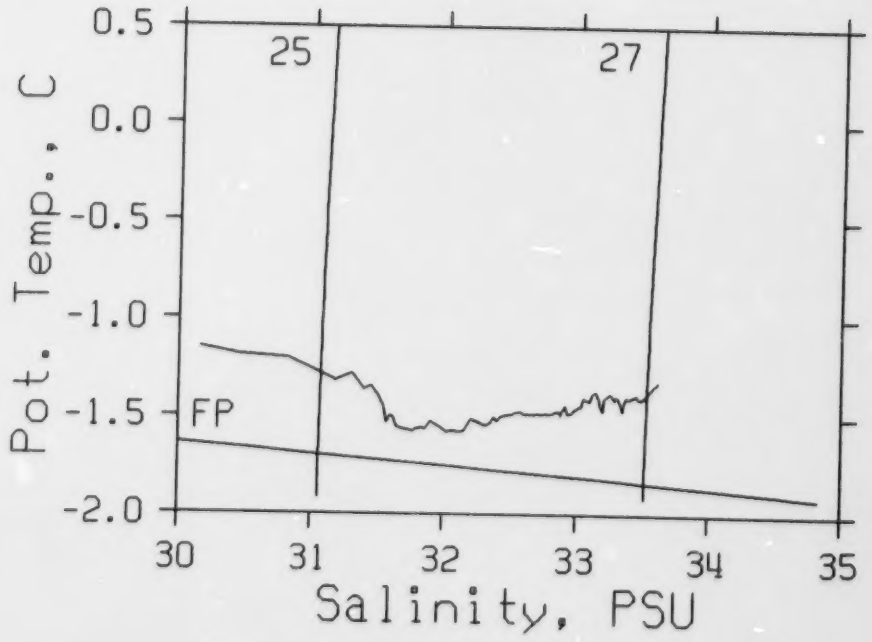




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L118
REFERENCE NO.: 91-70-025
DATE/TIME : 16/09/91 00:24 UTC
POSITION : 69-41.2N 138-44.2W

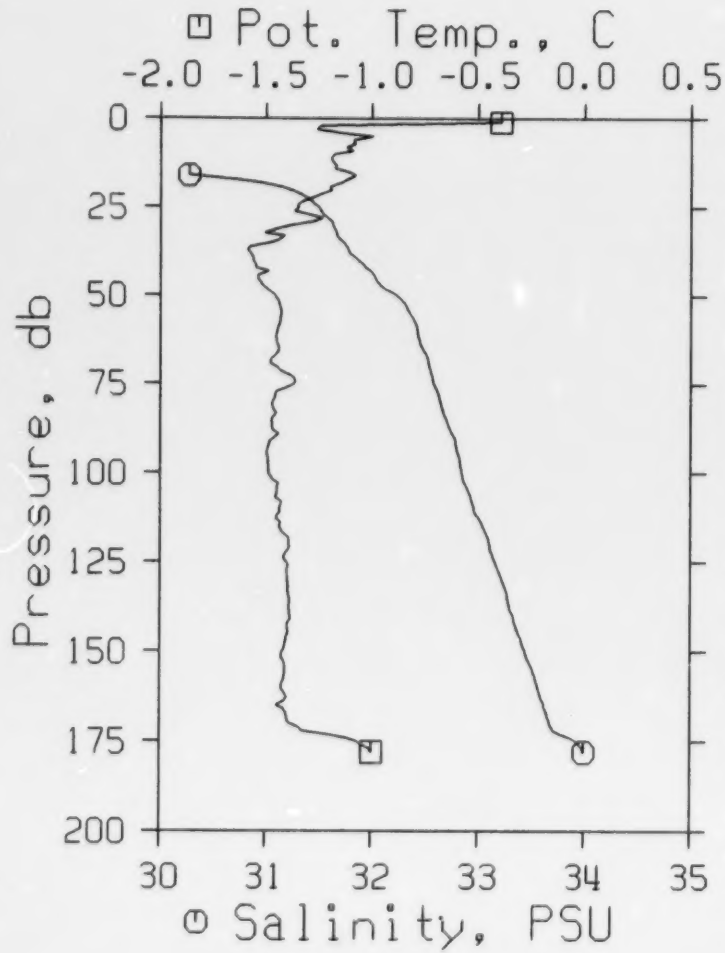
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.261	.261	23.570	18.91	880.4	.00	.00	1435
4	4	-.350	-.350	24.909	20.00	775.5	.35	.01	1434
5	5	-.948	-.948	26.489	21.28	652.1	.42	.01	1433
10	10	-1.190	-1.190	30.458	24.50	344.5	.65	.03	1438
20	20	-1.496	-1.496	31.599	25.44	255.8	.93	.07	1438
30	30	-1.547	-1.548	31.957	25.73	228.0	1.17	.13	1438
50	49	-1.486	-1.487	32.664	26.30	173.6	1.56	.29	1440
75	74	-1.374	-1.376	33.143	26.69	137.0	1.95	.53	1441
100	99	-1.331	-1.333	33.607	27.06	101.4	2.25	.80	1443
105	104	-1.325	-1.327	33.612	27.07	101.1	2.30	.85	1443

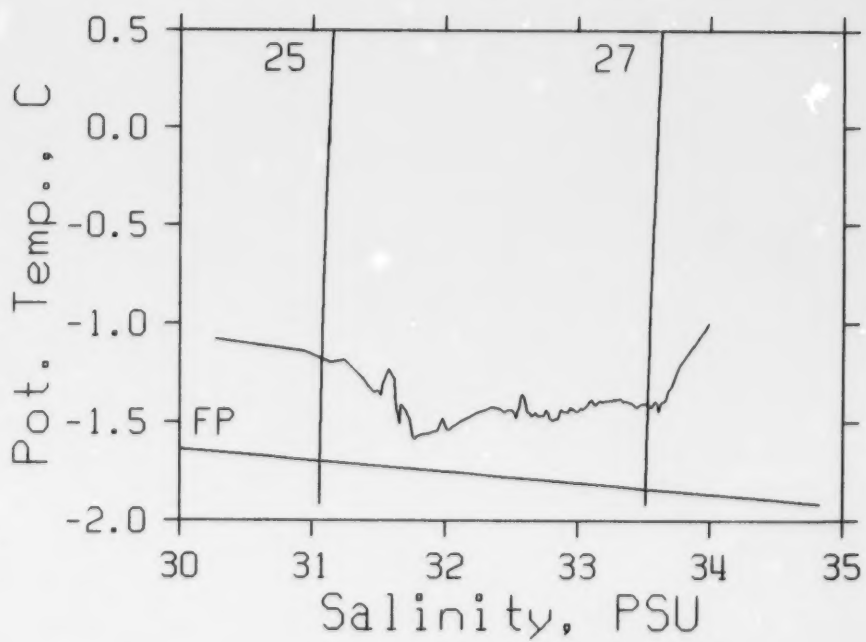




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L117
REFERENCE NO.: 91-70-026
DATE/TIME : 16/09/91 01:07 UTC
POSITION : 69-48.1N 138-40.4W

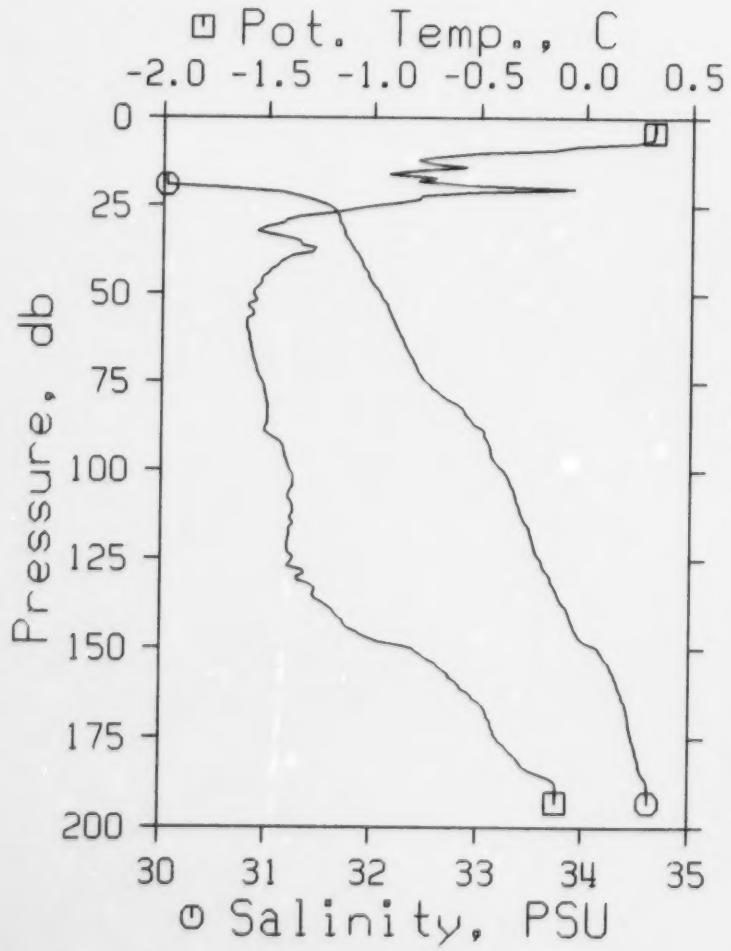
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.928	.928	16.455	13.18	1435.0	.00	.00	1429
2	2	-.964	-.964	24.897	20.00	775.9	.18	.00	1431
5	5	-.995	-.995	26.605	21.38	643.0	.40	.01	1433
10	10	-1.179	-1.179	27.453	22.07	577.1	.71	.03	1434
20	20	-1.187	-1.187	31.245	25.14	283.8	1.12	.09	1439
30	30	-1.375	-1.376	31.630	25.46	253.6	1.38	.16	1439
50	49	-1.453	-1.454	32.237	25.95	206.6	1.85	.35	1439
75	74	-1.366	-1.368	32.587	26.23	179.9	2.32	.65	1441
100	99	-1.482	-1.484	32.849	26.45	159.4	2.74	1.02	1441
125	124	-1.396	-1.399	33.156	26.70	135.9	3.11	1.44	1442
150	148	-1.416	-1.419	33.438	26.93	114.2	3.42	1.87	1443
175	173	-1.067	-1.072	33.922	27.31	78.0	3.67	2.29	1446
178	176	-.994	-.999	33.995	27.36	72.7	3.70	2.33	1446

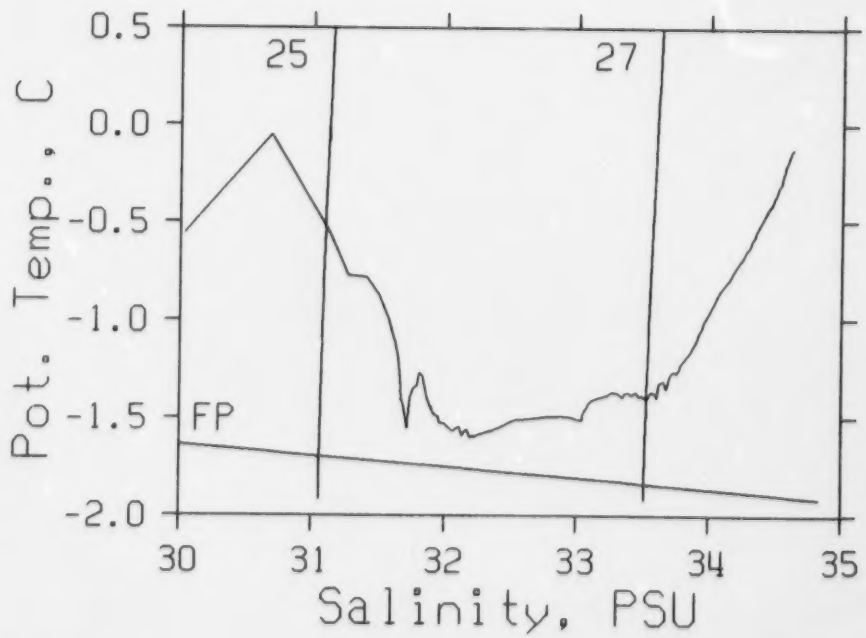




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L116
REFERENCE NO.: 91-70-029
DATE/TIME : 16/09/91 02:12 UTC
POSITION : 69-55.0N 138-11.6W

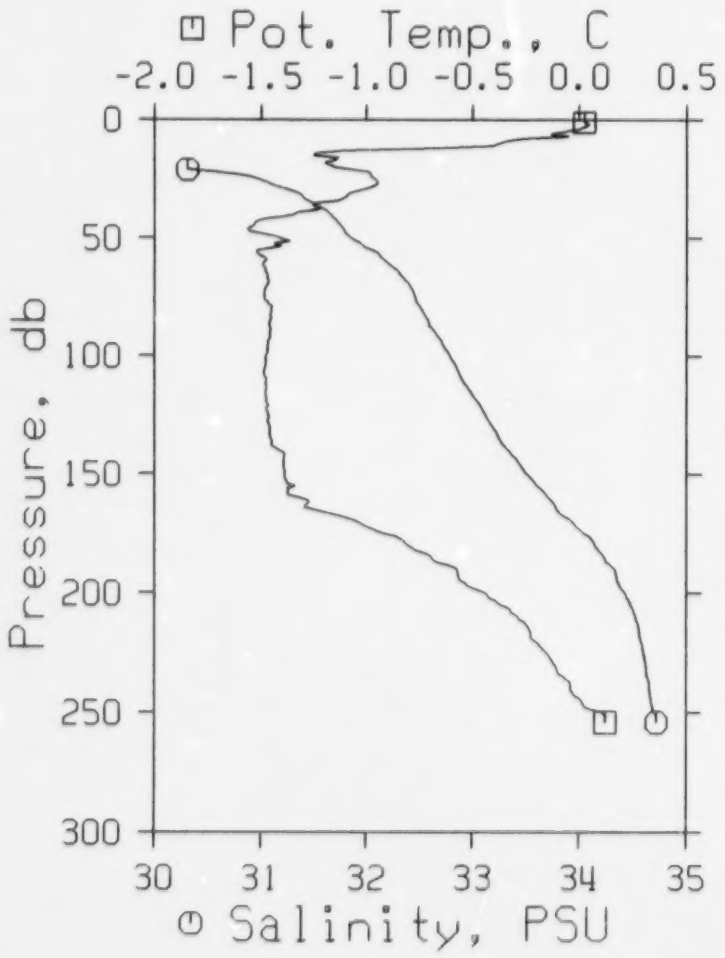
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.320	.320	13.837	11.08	1640.5	.00	.00	1422
5	5	.319	.319	13.840	11.08	1640.3	.82	.02	1423
10	10	-.500	-.500	20.958	16.81	1082.8	1.54	.07	1428
13	13	-.653	-.653	24.904	20.00	775.5	1.86	.11	1433
20	20	-.052	-.053	30.685	24.65	330.4	2.20	.17	1443
30	30	-1.426	-1.427	31.687	25.50	249.1	2.46	.24	1438
50	49	-1.564	-1.565	32.071	25.82	219.2	2.93	.43	1439
75	74	-1.519	-1.520	32.505	26.17	185.8	3.44	.75	1440
100	99	-1.383	-1.385	33.236	26.76	129.8	3.82	1.08	1442
125	124	-1.371	-1.374	33.589	27.05	102.7	4.11	1.41	1443
150	148	-.796	-.800	34.147	27.48	61.7	4.32	1.71	1447
175	173	-.401	-.407	34.470	27.72	38.6	4.44	1.90	1449
200	198	-.005	-.013	34.690	27.88	23.6	4.52	2.05	1452

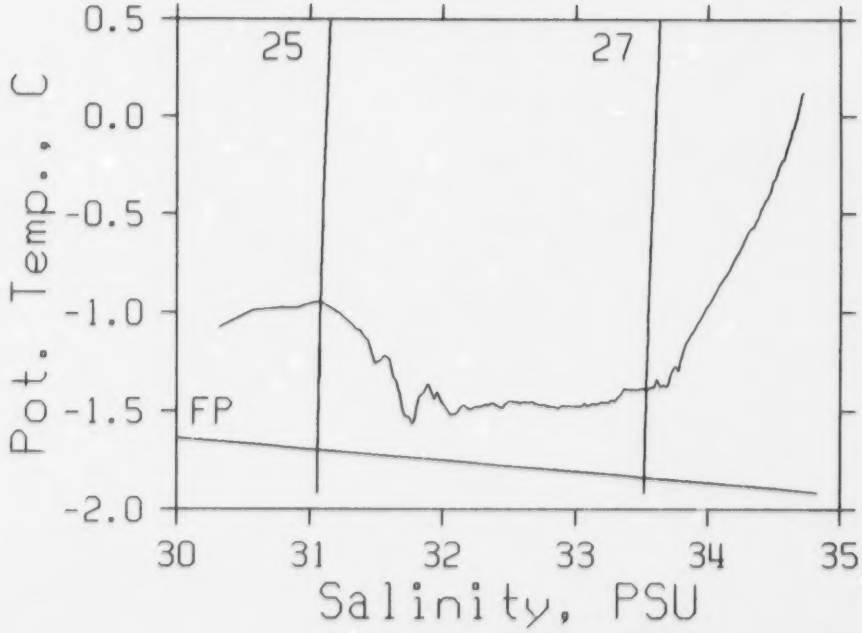




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L123
REFERENCE NO.: 91-70-030
DATE/TIME : 16/09/91 14:16 UTC
POSITION : 69-58.3N 138-34.0W

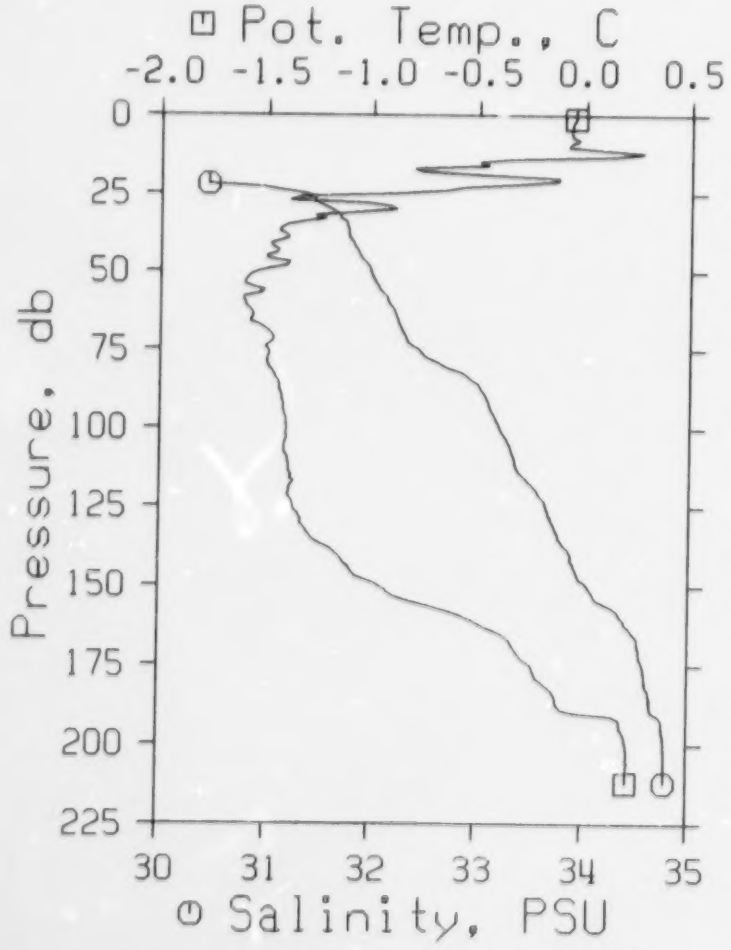
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.024	.024	16.847	13.50	1404.3	.00	.00	1425
5	5	-.069	-.069	17.650	14.15	1341.4	.70	.02	1426
10	10	-.377	-.377	21.173	16.99	1066.0	1.31	.06	1429
12	12	-.665	-.665	24.904	20.00	775.5	1.50	.08	1433
20	20	-1.154	-1.154	29.889	24.04	388.5	1.94	.15	1437
30	30	-1.051	-1.052	31.309	25.19	279.2	2.26	.23	1440
50	49	-1.405	-1.406	31.866	25.65	235.4	2.76	.44	1439
75	74	-1.482	-1.483	32.456	26.13	189.7	3.28	.76	1440
100	99	-1.476	-1.478	32.786	26.40	164.2	3.72	1.16	1441
125	124	-1.464	-1.467	33.123	26.67	138.3	4.10	1.59	1442
150	148	-1.386	-1.389	33.512	26.99	108.6	4.41	2.02	1443
175	173	-.906	-.911	34.052	27.41	68.6	4.63	2.38	1446
200	198	-.436	-.443	34.425	27.69	41.9	4.76	2.63	1450
225	223	-.147	-.155	34.600	27.82	29.8	4.85	2.82	1452
250	247	.120	.110	34.706	27.89	23.0	4.91	2.98	1453
254	251	.132	.122	34.721	27.90	21.9	4.92	3.00	1454

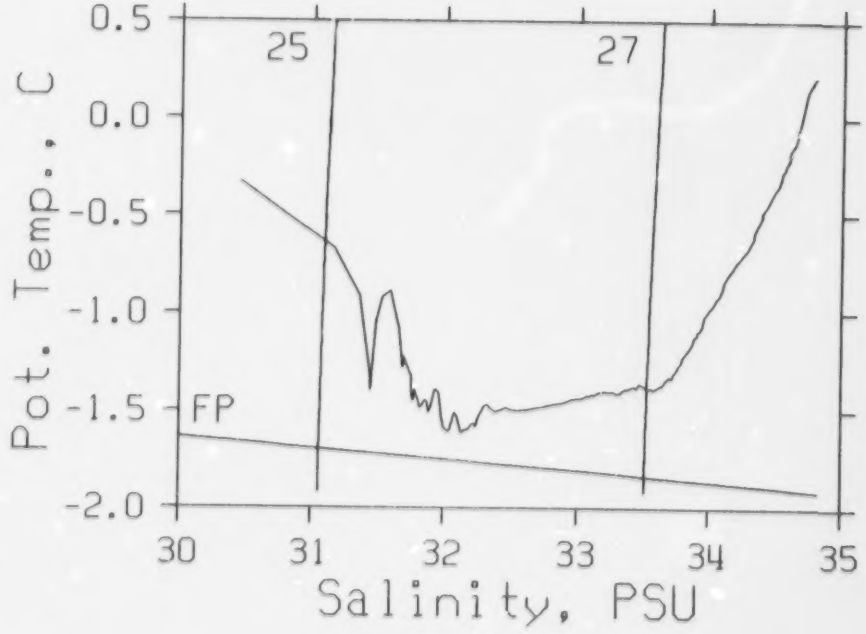




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L124
REFERENCE NO.: 91-70-031
DATE/TIME : 16/09/91 16:17 UTC
POSITION : 70- .9N 138-13.5W

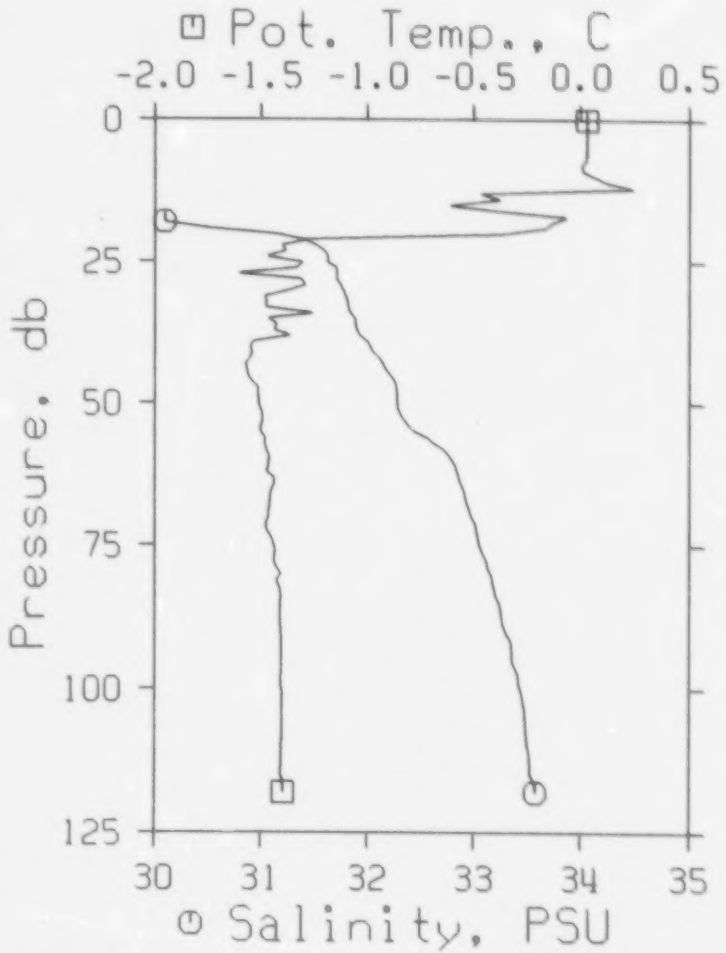
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.052	-.052	11.255	8.99	1845.2	.00	.00	1417
5	5	-.073	-.073	11.298	9.02	1841.8	.92	.02	1417
10	10	-.084	-.084	15.237	12.20	1530.8	1.80	.09	1423
14	14	-.311	-.311	24.910	20.00	775.5	2.26	.14	1434
20	20	-.128	-.128	28.825	23.15	473.2	2.63	.21	1441
30	30	-.888	-.889	31.595	25.42	257.6	2.94	.28	1441
50	49	-1.545	-1.546	31.987	25.75	225.7	3.42	.48	1439
75	74	-1.493	-1.494	32.443	26.12	190.7	3.94	.81	1440
100	99	-1.403	-1.405	33.216	26.75	131.3	4.32	1.14	1442
125	124	-1.367	-1.370	33.653	27.10	97.8	4.61	1.47	1443
150	148	-.952	-.956	34.039	27.40	69.4	4.82	1.77	1446
175	173	-.232	-.238	34.573	27.80	31.5	4.93	1.95	1450
200	198	.219	.211	34.786	27.95	17.4	4.99	2.07	1453
212	210	.220	.212	34.793	27.95	16.9	5.01	2.11	1453

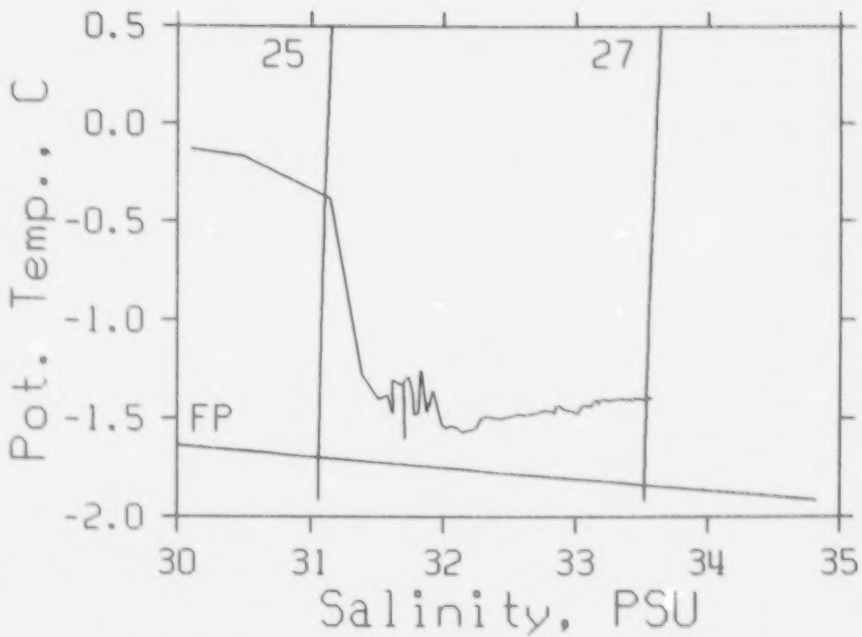




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L125
REFERENCE NO.: 91-70-032
DATE/TIME : 16/09/91 17:07 UTC
POSITION : 70- 4.0N 137-49.7W

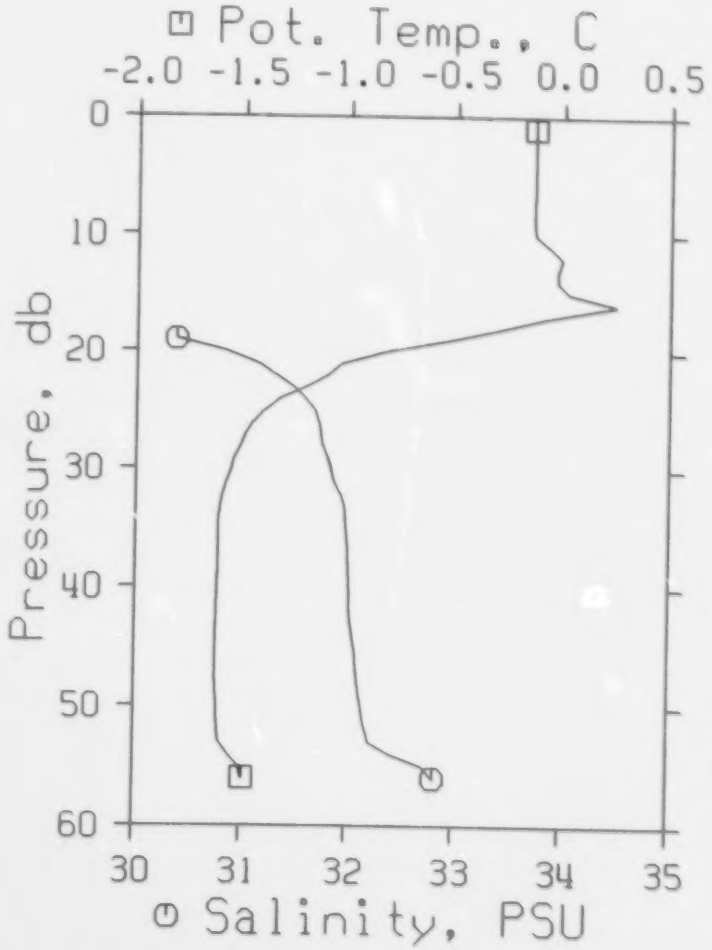
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.030	.030	11.045	8.82	1861.6	.00	.00	1417
5	5	.029	.029	11.071	8.85	1859.5	.93	.02	1417
10	10	.065	.065	16.614	13.31	1422.5	1.81	.09	1425
13	13	-.345	-.346	24.908	20.00	775.6	2.14	.13	1434
20	20	-.379	-.380	31.143	25.03	294.0	2.48	.18	1443
30	30	-1.376	-1.377	31.777	25.58	242.3	2.74	.25	1439
50	49	-1.509	-1.510	32.286	25.99	202.7	3.18	.43	1439
75	74	-1.437	-1.439	33.052	26.61	143.9	3.60	.69	1441
100	99	-1.400	-1.402	33.434	26.92	114.5	3.92	.97	1442
125	124	-1.390	-1.393	33.633	27.08	99.2	4.18	1.27	1443

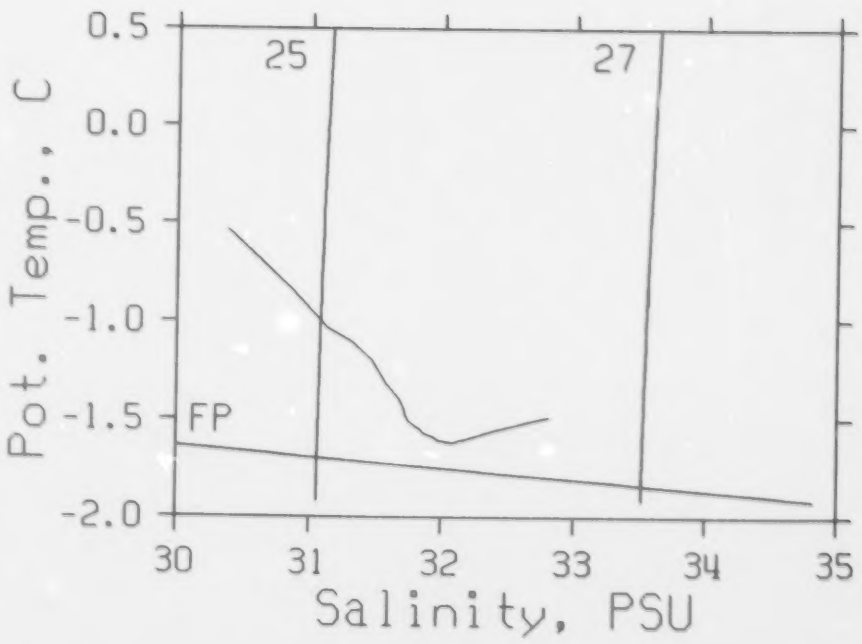




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L126
REFERENCE NO.: 91-70-033
DATE/TIME : 16/09/91 17:49 UTC
POSITION : 70- 7.0N 137-26.2W

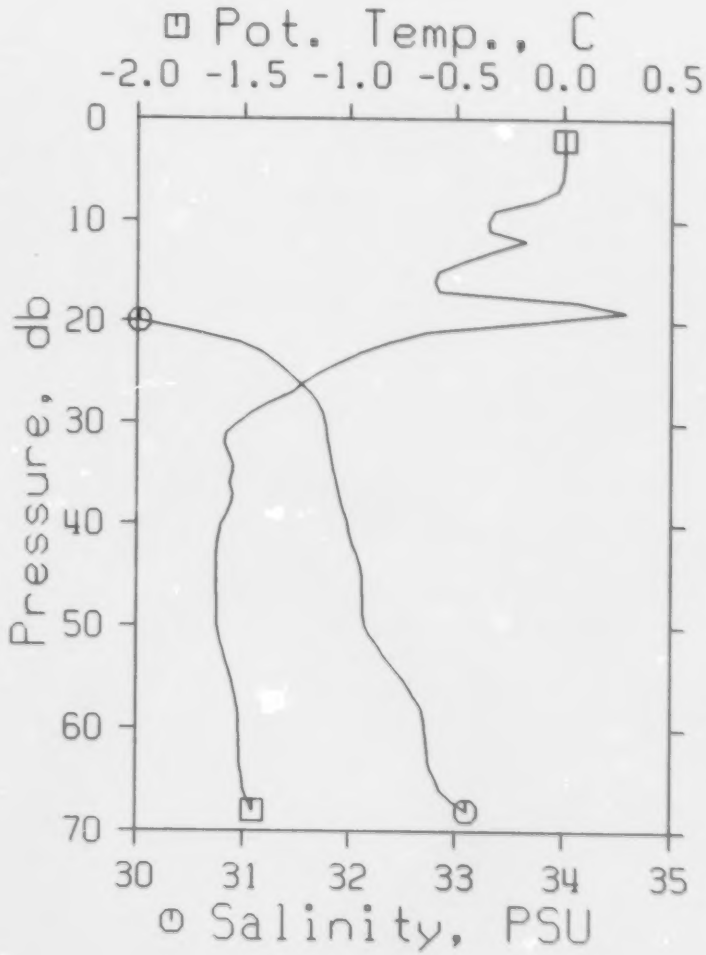
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.134	-.134	15.644	12.53	1498.9	.00	.00	1423
5	5	-.136	-.136	15.646	12.53	1498.7	.75	.02	1423
10	10	-.132	-.132	16.273	13.04	1449.5	1.50	.08	1424
16	16	.178	.177	24.923	20.00	775.6	2.18	.16	1437
20	20	-.826	-.826	30.836	24.80	316.2	2.38	.20	1440
30	30	-1.550	-1.550	31.837	25.63	237.3	2.64	.26	1438
50	49	-1.608	-1.609	32.144	25.88	213.5	3.08	.45	1439
56	55	-1.487	-1.488	32.824	26.43	161.3	3.20	.51	1440

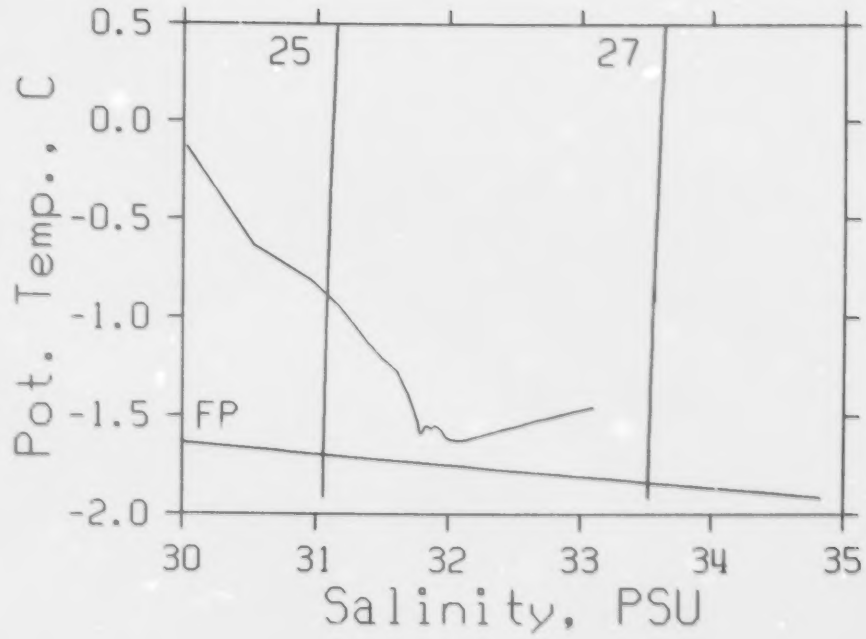




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L127
REFERENCE NO.: 91-70-034
DATE/TIME : 16/09/91 18:23 UTC
POSITION : 70- 9.3N 137-39.4W

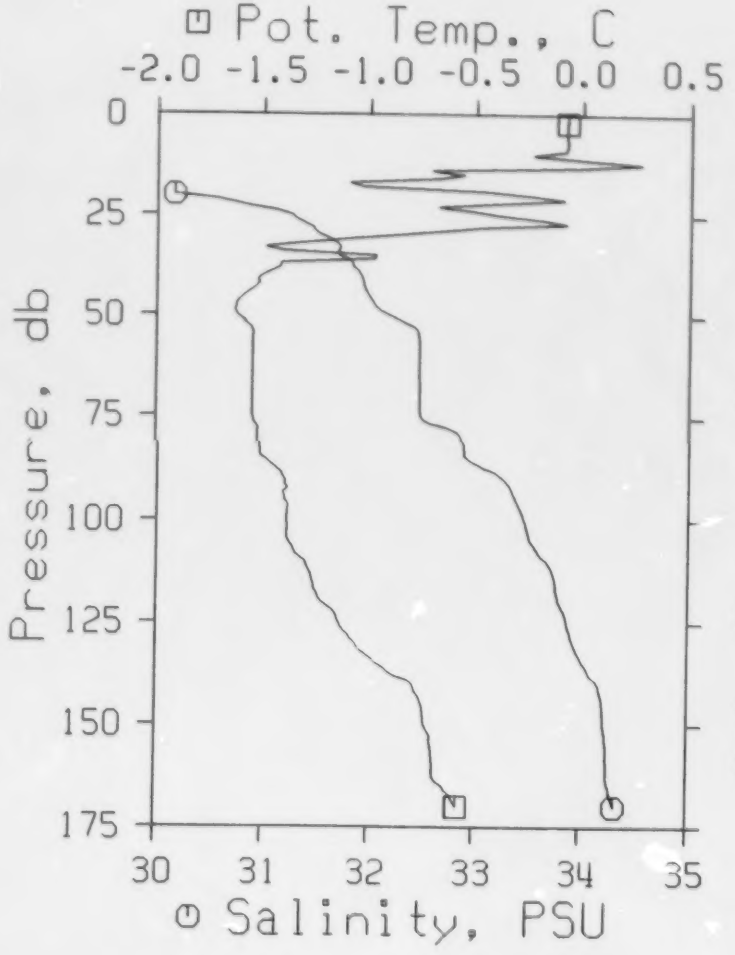
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.003	.003	11.263	9.00	1844.4	.00	.00	1418
5	5	.000	.000	11.266	9.00	1844.2	.92	.02	1418
10	10	-.349	-.349	13.995	11.19	1629.2	1.80	.09	1420
14	14	-.474	-.474	24.907	20.00	775.5	2.33	.15	1434
20	20	-.128	-.129	30.026	24.12	380.8	2.67	.21	1442
30	30	-1.523	-1.523	31.769	25.57	242.6	2.95	.28	1438
50	49	-1.621	-1.622	32.146	25.88	213.3	3.40	.46	1438
75	74	-1.428	-1.429	33.252	26.77	128.5	3.81	.72	1441

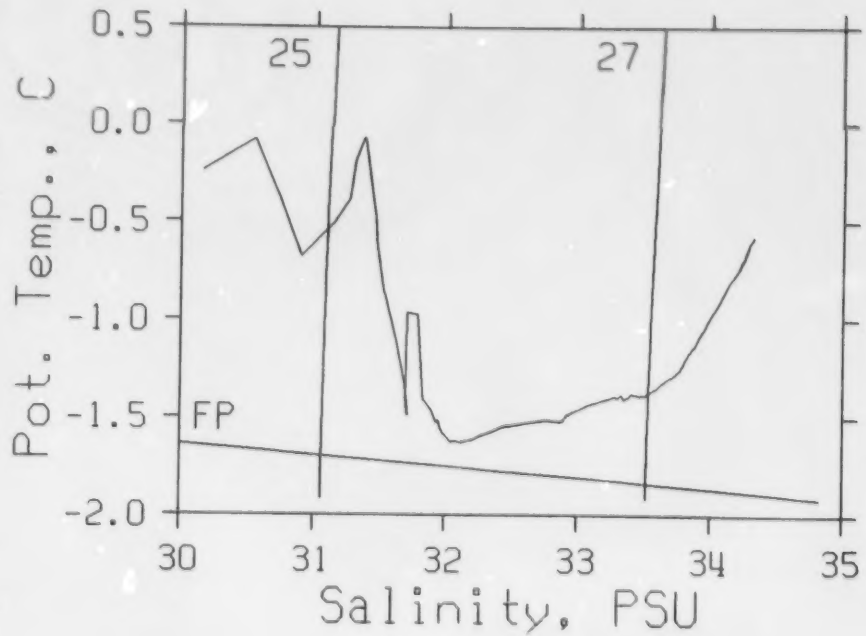




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L128
REFERENCE NO.: 91-70-035
DATE/TIME : 16/09/91 18:53 UTC
POSITION : 70-11.0N 137-54.2W

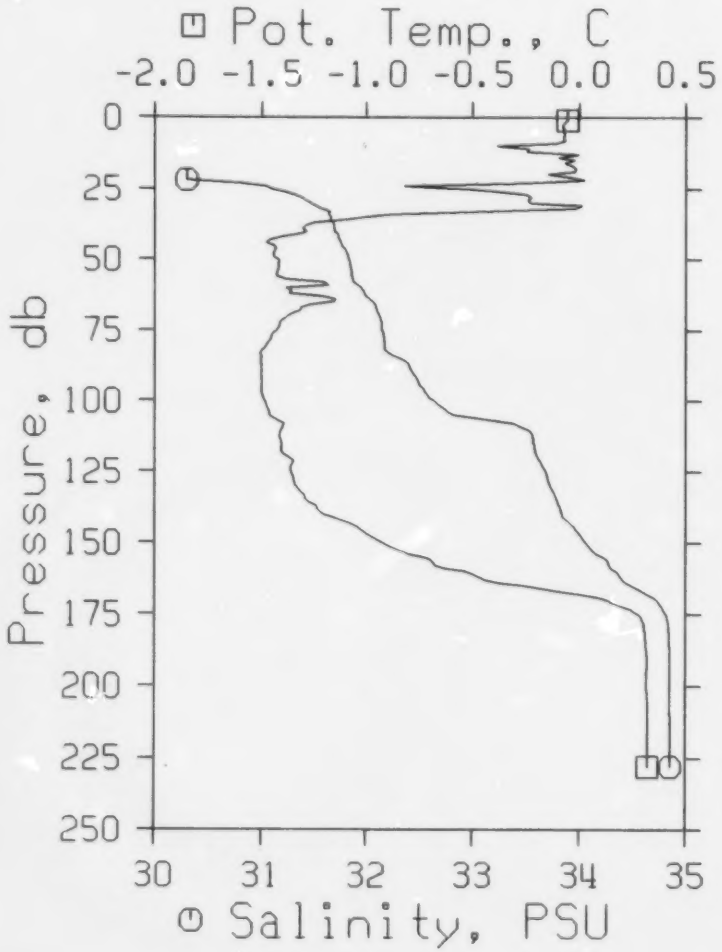
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.075	-.075	11.434	9.14	1831.0	.00	.00	1417
5	5	-.076	-.076	11.454	9.15	1829.5	.92	.02	1417
10	10	-.238	-.238	14.381	11.51	1598.5	1.82	.09	1421
13	13	-.176	-.177	24.912	20.00	775.5	2.19	.13	1435
20	20	-.239	-.239	30.162	24.24	369.9	2.56	.20	1442
30	30	-.867	-.868	31.534	25.37	262.3	2.85	.27	1441
50	49	-1.616	-1.617	32.201	25.93	209.0	3.32	.46	1439
75	74	-1.543	-1.544	32.491	26.16	186.8	3.79	.76	1440
100	99	-1.389	-1.391	33.467	26.95	112.0	4.14	1.07	1442
125	124	-1.138	-1.141	33.876	27.27	81.3	4.38	1.34	1444
150	148	-.728	-.732	34.225	27.54	56.0	4.54	1.57	1447
175	173	-.493	-.498	34.373	27.65	45.6	4.67	1.78	1449

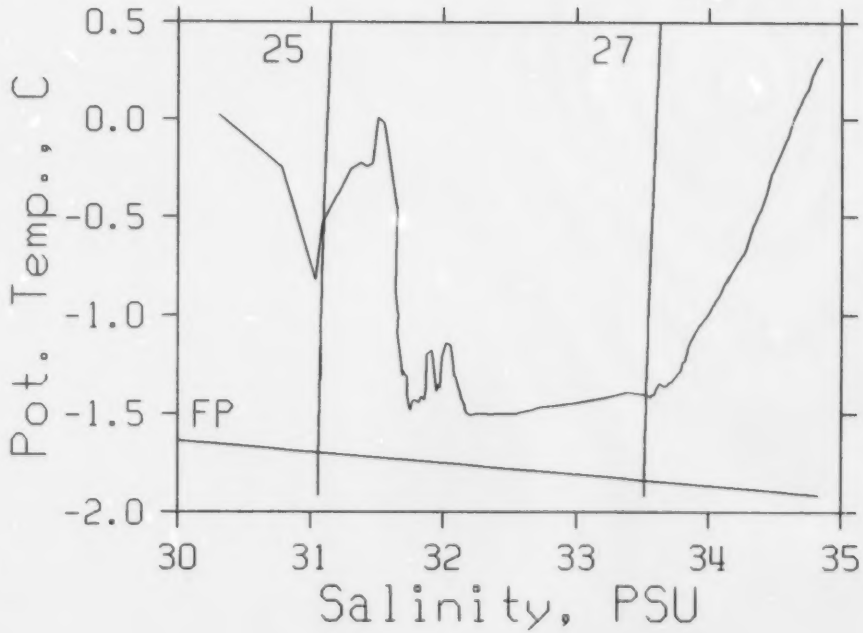




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L129
REFERENCE NO.: 91-70-036
DATE/TIME : 16/09/91 19:17 UTC
POSITION : 70-13.1N 138- .8W

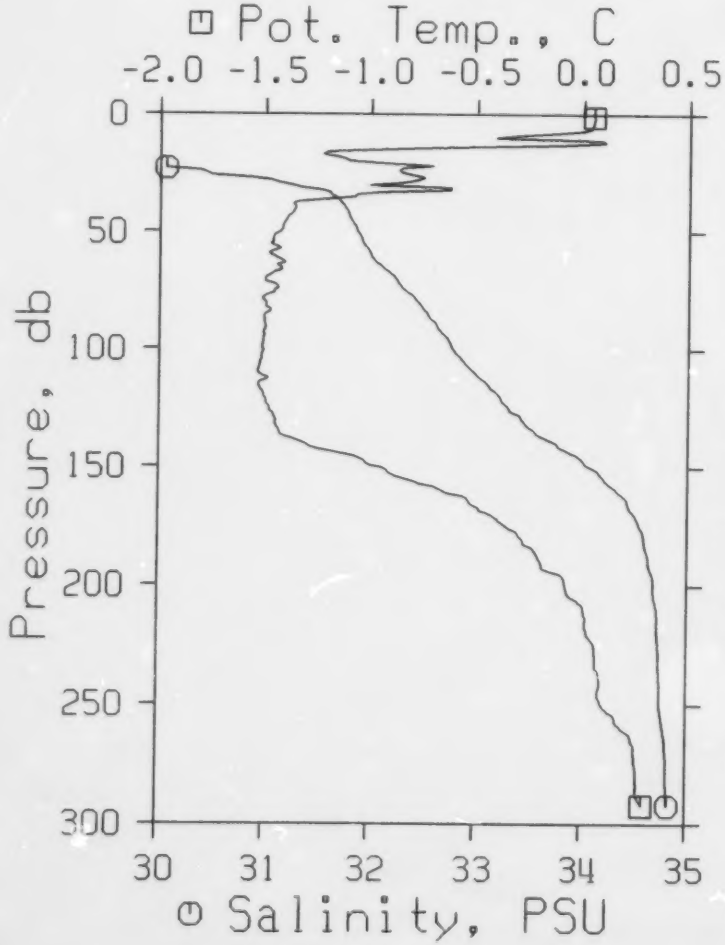
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.057	-.057	11.619	9.28	1816.3	.00	.00	1418
5	5	-.069	-.069	11.676	9.33	1811.9	.91	.02	1418
10	10	-.385	-.385	13.105	10.48	1699.6	1.81	.09	1418
14	14	-.096	-.096	24.915	20.00	775.5	2.25	.14	1435
20	20	-.147	-.147	29.122	23.39	450.3	2.61	.21	1441
30	30	-.224	-.225	31.469	25.29	269.5	2.93	.29	1444
50	49	-1.417	-1.418	31.835	25.63	237.7	3.42	.49	1439
75	74	-1.428	-1.429	32.146	25.88	213.7	3.99	.84	1440
100	99	-1.483	-1.485	32.638	26.28	175.6	4.48	1.28	1441
125	124	-1.356	-1.359	33.687	27.13	95.2	4.78	1.62	1443
150	148	-.917	-.921	34.063	27.42	67.7	4.99	1.91	1446
175	173	.284	.277	34.818	27.97	15.4	5.09	2.07	1453
200	198	.323	.315	34.852	28.00	13.0	5.12	2.14	1454
225	223	.331	.322	34.856	28.00	12.7	5.16	2.21	1454
228	226	.331	.322	34.856	28.00	12.7	5.16	2.22	1454

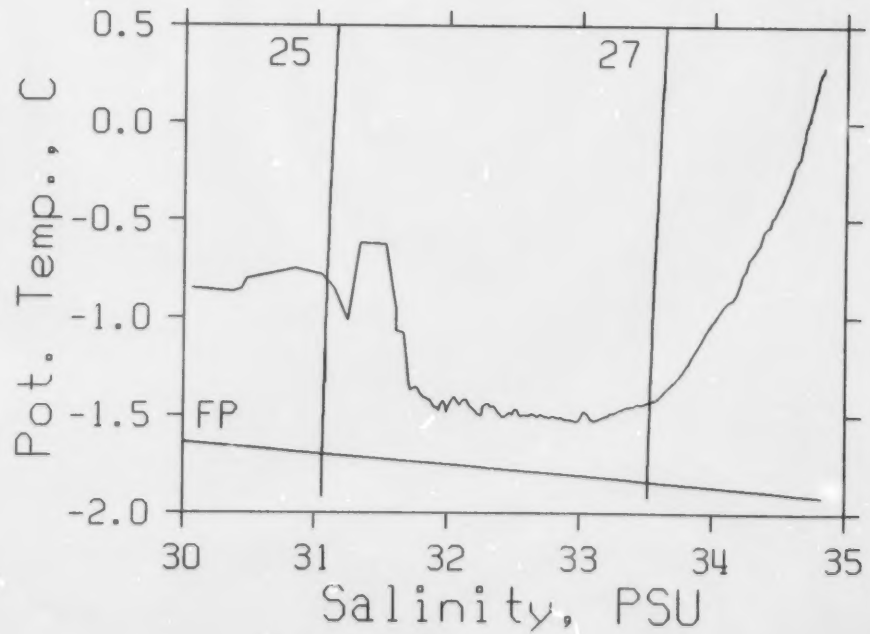




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L130
REFERENCE NO.: 91-70-037
DATE/TIME : 16/09/91 19:39 UTC
POSITION : 70-14.0N 138- 6.2W

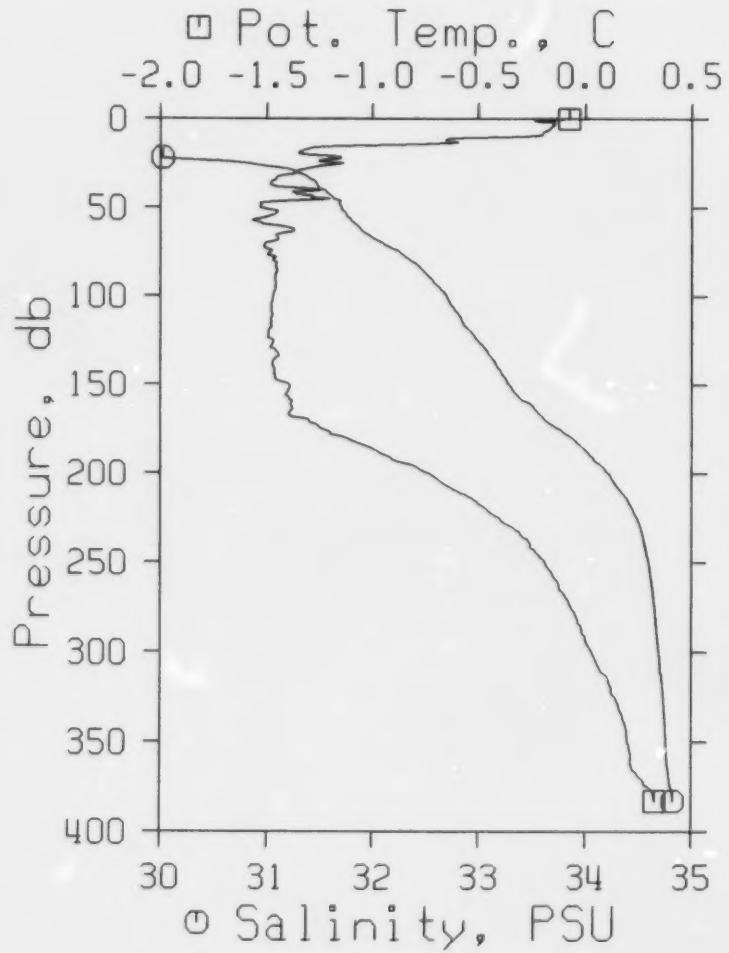
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.046	.046	11.490	9.18	1826.3	.00	.00	1418
5	5	.041	.041	11.490	9.18	1826.3	.91	.02	1418
10	10	-.418	-.418	14.803	11.85	1565.6	1.80	.09	1420
13	13	-.166	-.166	24.913	20.00	775.5	2.11	.13	1435
20	20	-1.101	-1.101	28.651	23.04	484.4	2.51	.19	1436
30	30	-1.009	-1.010	31.247	25.14	284.1	2.87	.28	1440
50	49	-1.428	-1.429	31.877	25.66	234.5	3.36	.48	1439
75	74	-1.455	-1.456	32.328	26.03	199.6	3.91	.83	1440
100	99	-1.506	-1.508	32.782	26.40	164.5	4.36	1.22	1441
125	124	-1.473	-1.476	33.306	26.82	124.2	4.72	1.63	1442
150	148	-.942	-.946	34.083	27.43	66.1	4.95	1.96	1446
175	173	-.347	-.353	34.555	27.79	32.3	5.07	2.15	1450
200	198	-.069	-.076	34.688	27.88	23.5	5.14	2.28	1452
225	223	.072	.063	34.737	27.92	20.4	5.19	2.40	1453
250	247	.111	.101	34.755	27.93	19.2	5.24	2.52	1453
300	297	.329	.316	34.846	27.99	13.4	5.32	2.74	1455

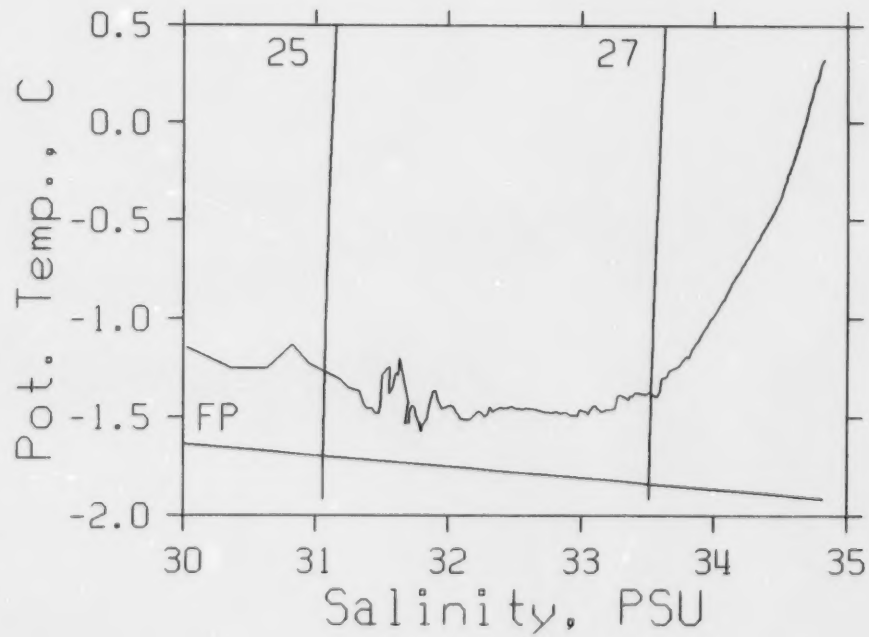




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L131
REFERENCE NO.: 91-70-038
DATE/TIME : 16/09/91 20:16 UTC
POSITION : 70-17.0N 138-20.2W

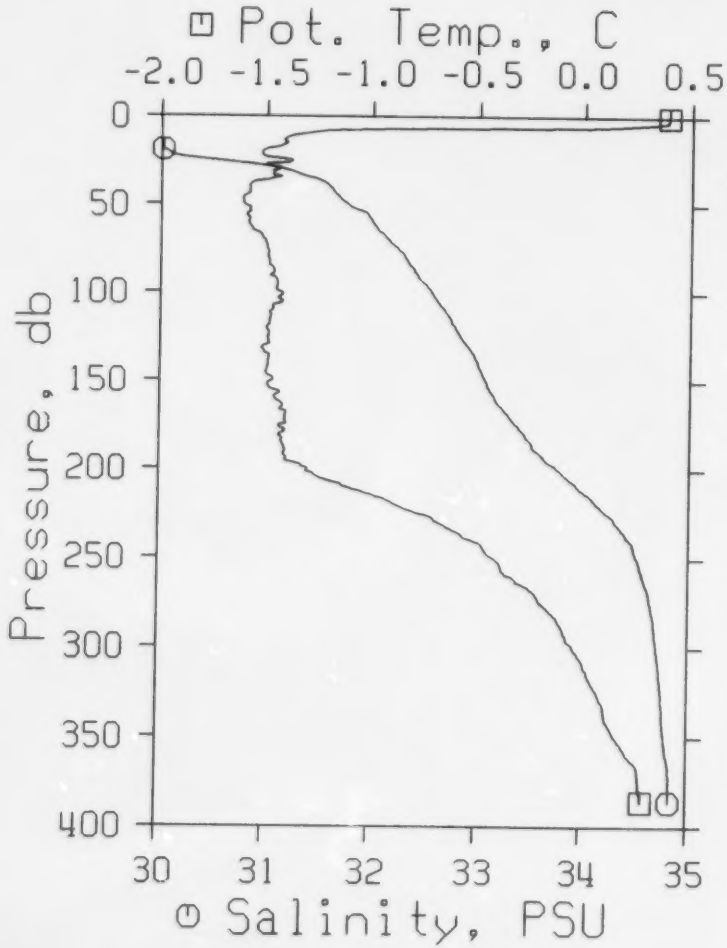
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.077	-.077	13.345	10.68	1679.9	.00	.00	1420
5	5	-.165	-.165	13.282	10.62	1685.1	.84	.02	1419
10	10	-.282	-.282	14.714	11.78	1572.3	1.66	.08	1421
15	15	-1.136	-1.136	24.899	20.00	775.5	2.26	.16	1430
20	20	-1.322	-1.322	29.037	23.35	454.1	2.54	.21	1435
30	30	-1.363	-1.364	31.291	25.18	279.8	2.87	.29	1438
50	49	-1.530	-1.531	31.710	25.53	247.1	3.39	.50	1438
75	74	-1.477	-1.478	32.253	25.97	205.3	3.97	.86	1440
100	99	-1.469	-1.471	32.696	26.33	171.2	4.43	1.28	1441
125	124	-1.464	-1.467	32.991	26.57	148.5	4.83	1.73	1442
150	148	-1.390	-1.393	33.286	26.80	126.0	5.17	2.20	1443
175	173	-1.233	-1.237	33.750	27.17	90.7	5.44	2.65	1445
200	198	-.726	-.732	34.218	27.53	56.5	5.62	2.99	1448
225	223	-.398	-.406	34.492	27.74	36.9	5.73	3.24	1450
250	247	-.183	-.192	34.603	27.82	29.4	5.81	3.43	1452
300	297	.042	.030	34.697	27.89	23.3	5.94	3.79	1454
400	396	.434	.417	34.890	28.02	10.6	6.13	4.44	1457

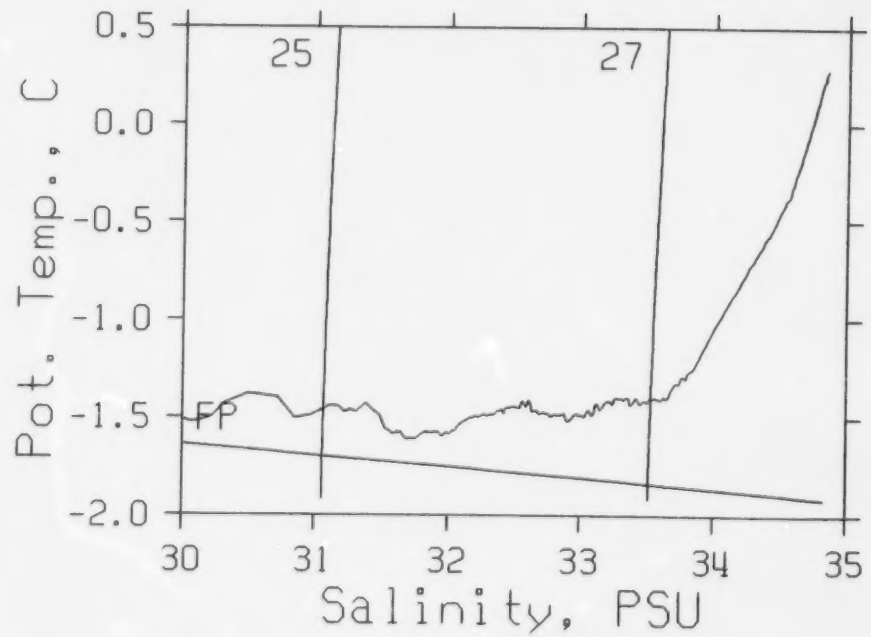




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L132
REFERENCE NO.: 91-70-039
DATE/TIME : 16/09/91 21:53 UTC
POSITION : 70-13.0N 139-12.2W

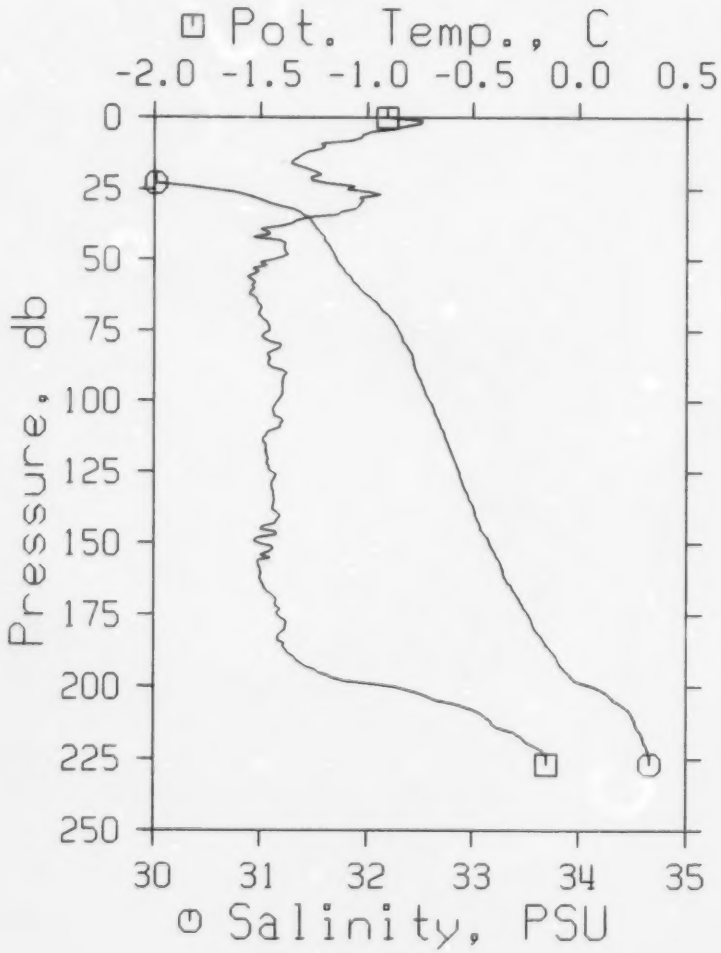
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.393	.393	19.123	15.33	1226.3	.00	.00	1430
5	5	.150	.150	20.206	16.20	1141.7	.61	.02	1430
7	7	-.841	-.841	24.901	20.00	775.5	.80	.03	1432
10	10	-1.332	-1.332	28.182	22.66	520.4	.99	.04	1434
20	20	-1.523	-1.523	30.057	24.18	374.9	1.42	.11	1436
30	30	-1.443	-1.443	31.181	25.09	288.1	1.75	.19	1438
50	49	-1.602	-1.603	31.772	25.58	242.2	2.27	.40	1438
75	74	-1.494	-1.495	32.243	25.96	206.1	2.82	.75	1440
100	99	-1.422	-1.424	32.562	26.22	181.6	3.31	1.18	1441
125	124	-1.487	-1.489	32.835	26.44	160.4	3.73	1.66	1441
150	148	-1.461	-1.464	33.074	26.63	142.1	4.10	2.19	1442
175	173	-1.430	-1.434	33.378	26.88	118.8	4.43	2.73	1443
200	198	-1.288	-1.293	33.773	27.19	88.8	4.69	3.22	1445
225	223	-.756	-.763	34.248	27.56	54.1	4.87	3.60	1448
250	247	-.408	-.416	34.521	27.77	34.6	4.97	3.85	1451
300	297	-.027	-.038	34.709	27.90	22.0	5.11	4.22	1454
400	396	.325	.308	34.846	27.99	13.4	5.27	4.82	1457

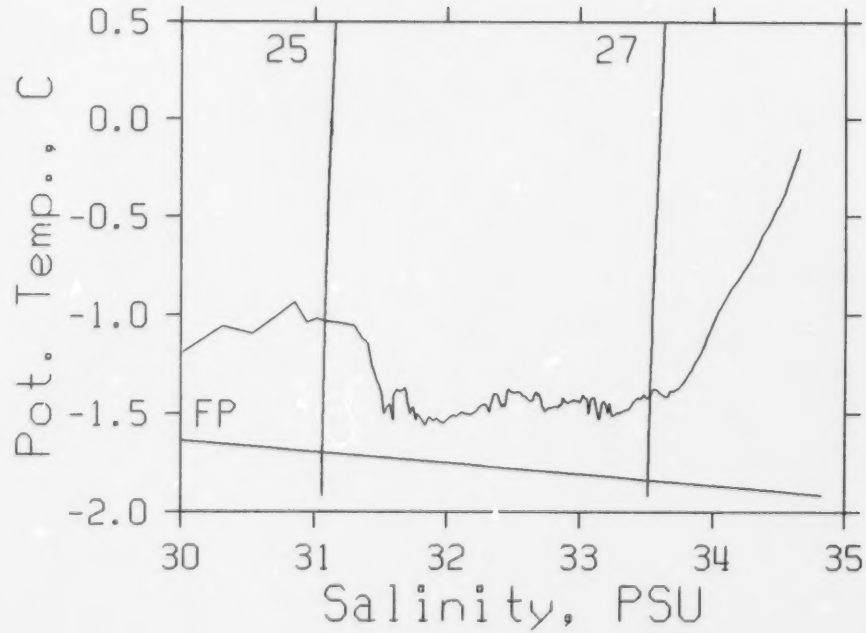




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L133
REFERENCE NO.: 91-70-040
DATE/TIME : 16/09/91 22:28 UTC
POSITION : 70- 9.1N 139-15.0W

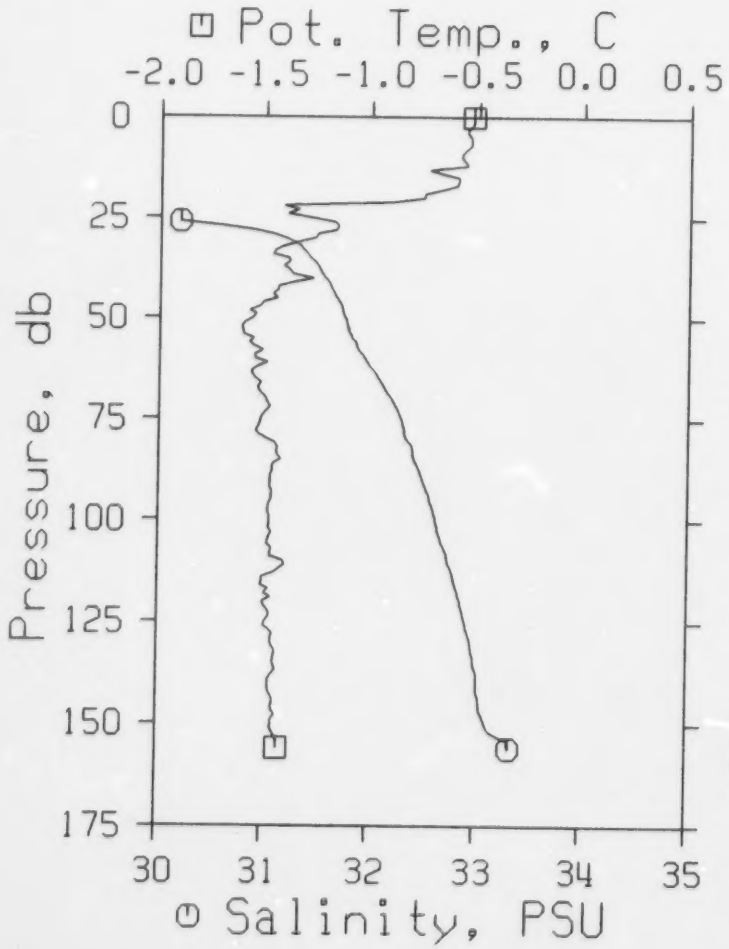
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.906	-.906	26.731	21.48	633.4	.00	.00	1434
5	5	-.981	-.981	27.161	21.83	599.9	.32	.01	1434
10	10	-1.196	-1.196	28.160	22.64	522.2	.61	.03	1434
20	20	-1.215	-1.215	29.601	23.81	410.7	1.06	.10	1437
30	30	-1.033	-1.034	31.101	25.02	295.3	1.41	.19	1440
50	49	-1.450	-1.451	31.708	25.52	247.4	1.93	.40	1439
75	74	-1.456	-1.457	32.300	26.00	201.8	2.49	.75	1440
100	99	-1.413	-1.415	32.593	26.24	179.3	2.97	1.17	1441
125	124	-1.441	-1.444	32.873	26.47	157.6	3.39	1.65	1442
150	148	-1.500	-1.503	33.160	26.70	135.4	3.75	2.16	1442
175	173	-1.413	-1.417	33.527	27.00	107.3	4.06	2.66	1443
200	198	-.863	-.869	34.140	27.48	62.0	4.28	3.09	1447
225	223	-.142	-.150	34.663	27.87	25.0	4.37	3.28	1452
227	225	-.142	-.150	34.664	27.87	24.9	4.38	3.30	1452

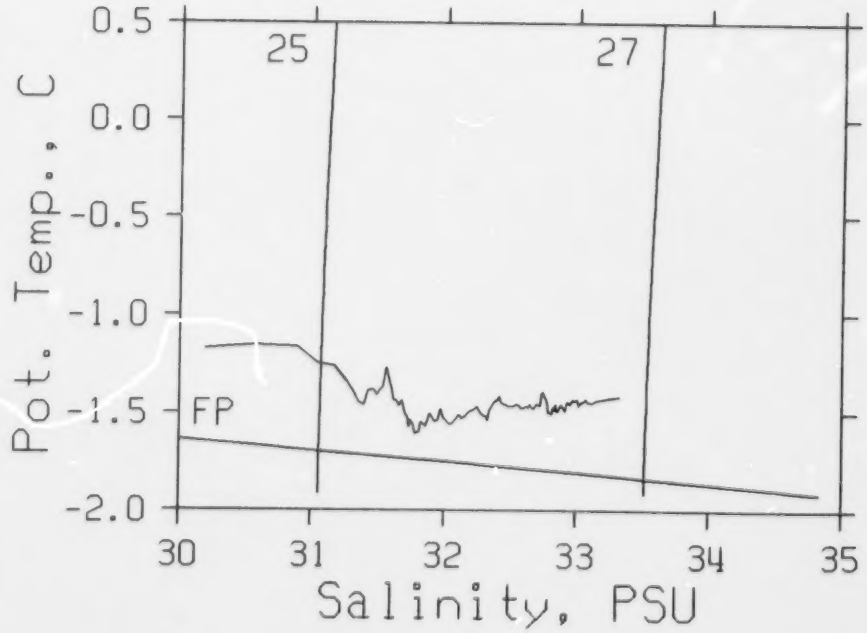




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L134
REFERENCE NO.: 91-70-041
DATE/TIME : 16/09/91 22:58 UTC
POSITION : 70- 5.2N 139-16.1W

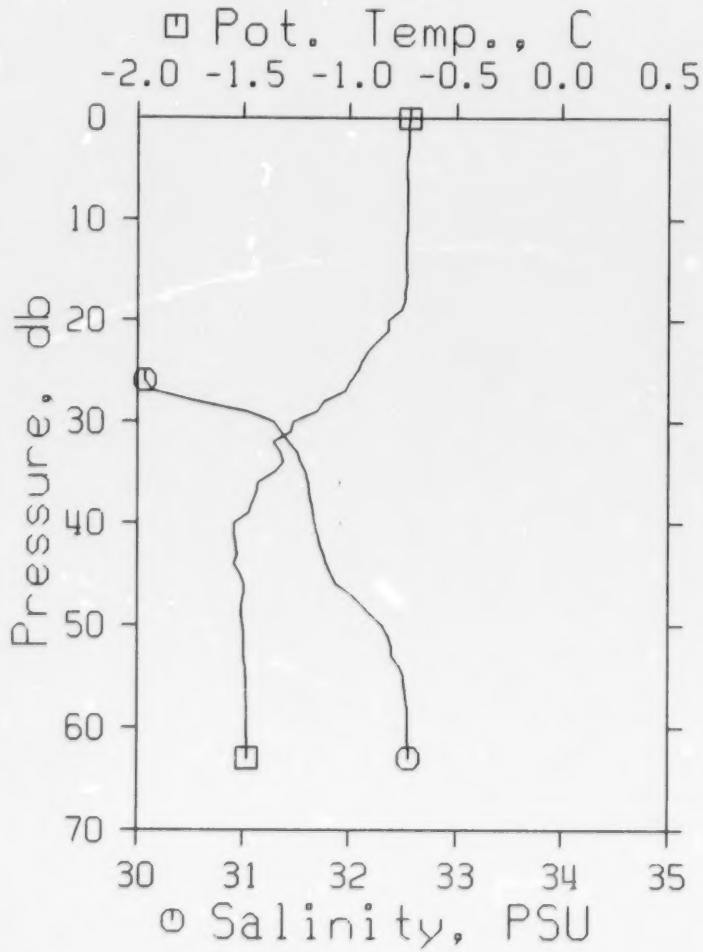
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.528	-.528	25.839	20.75	703.1	.00	.00	1434
5	5	-.539	-.539	25.871	20.78	700.6	.35	.01	1434
10	10	-.584	-.584	25.947	20.84	694.6	.70	.04	1434
20	20	-.755	-.755	26.359	21.18	662.4	1.38	.14	1434
30	30	-1.261	-1.262	31.173	25.08	289.2	1.79	.24	1439
50	49	-1.555	-1.556	31.762	25.57	243.1	2.31	.45	1438
75	74	-1.514	-1.515	32.296	26.00	201.9	2.86	.80	1440
100	99	-1.467	-1.469	32.620	26.26	177.1	3.34	1.22	1441
125	124	-1.485	-1.488	32.907	26.50	154.9	3.75	1.69	1441
150	148	-1.447	-1.450	33.105	26.66	139.7	4.11	2.20	1442
156	154	-1.420	-1.423	33.330	26.84	122.5	4.19	2.32	1443

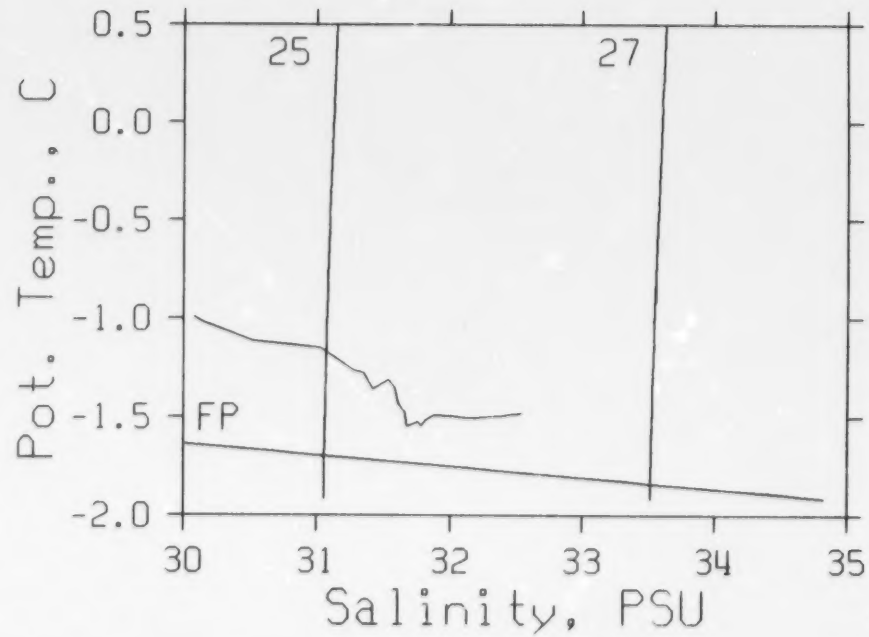




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L135
REFERENCE NO.: 91-70-042
DATE/TIME : 16/09/91 23:29 UTC
POSITION : 70- 1.0N 139-18.8W

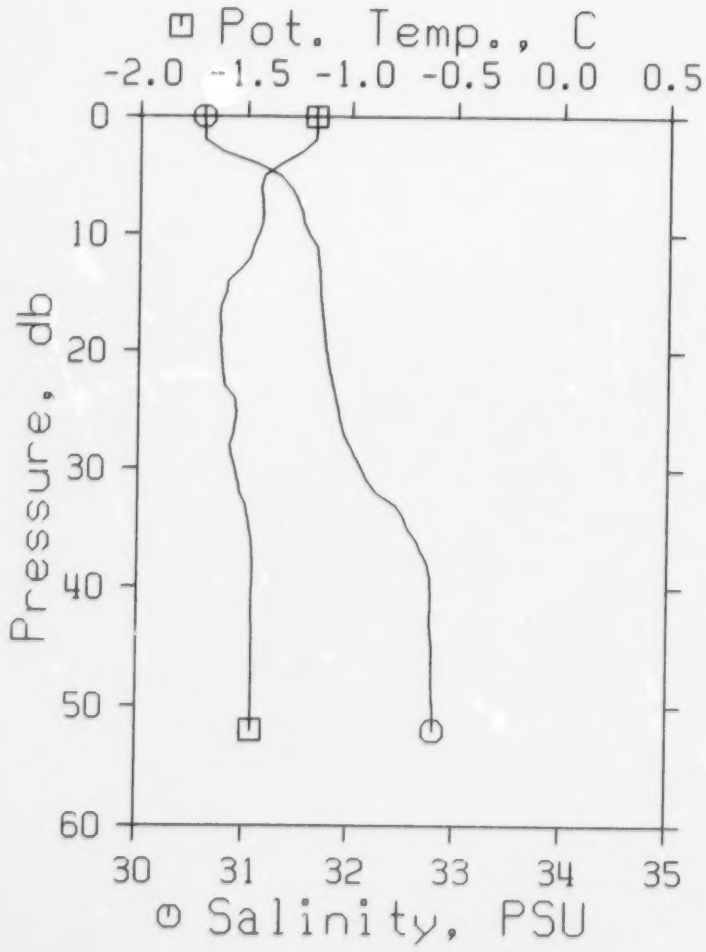
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.721	-.721	29.227	23.50	440.6	.00	.00	1438
5	5	-.734	-.734	29.183	23.46	444.0	.22	.01	1438
10	10	-.732	-.732	29.169	23.45	445.1	.44	.02	1438
20	20	-.821	-.821	29.510	23.73	418.5	.88	.09	1438
30	30	-1.264	-1.265	31.285	25.18	280.5	1.26	.18	1439
50	49	-1.499	-1.500	32.309	26.01	201.0	1.75	.38	1439
63	62	-1.478	-1.479	32.554	26.21	182.1	1.99	.52	1440

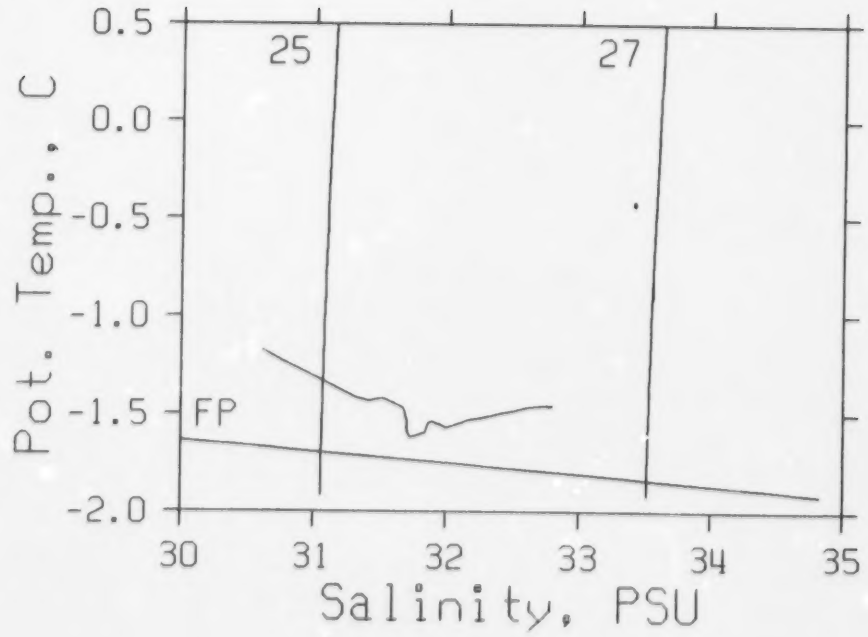




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L136
REFERENCE NO.: 91-70-043
DATE/TIME : 17/09/91 00:01 UTC
POSITION : 69-56.7N 139-22.2W

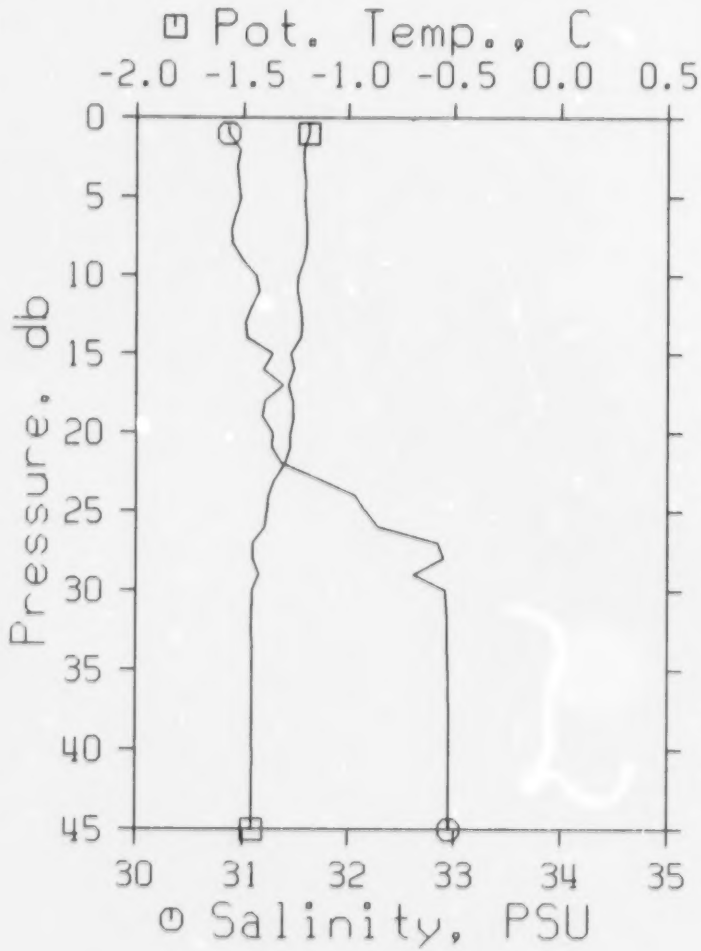
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-1.172	-1.172	30.596	24.61	333.9	.00	.00	1438
5	5	-1.418	-1.418	31.315	25.20	277.9	.16	.00	1438
10	10	-1.444	-1.444	31.597	25.43	256.0	.29	.01	1438
20	20	-1.611	-1.611	31.773	25.58	242.1	.54	.05	1438
30	30	-1.545	-1.546	32.114	25.85	215.9	.77	.11	1438
50	49	-1.457	-1.458	32.810	26.42	162.4	1.12	.25	1440
52	51	-1.458	-1.459	32.809	26.42	162.5	1.15	.27	1440

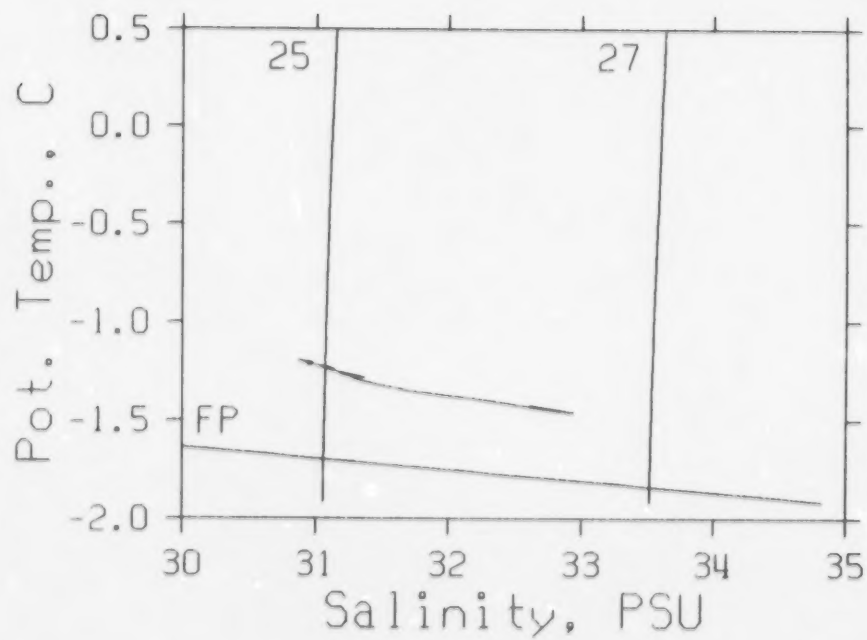




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L137
REFERENCE NO.: 91-70-044
DATE/TIME : 17/09/91 00:27 UTC
POSITION : 69-53.1N 139-23.9W

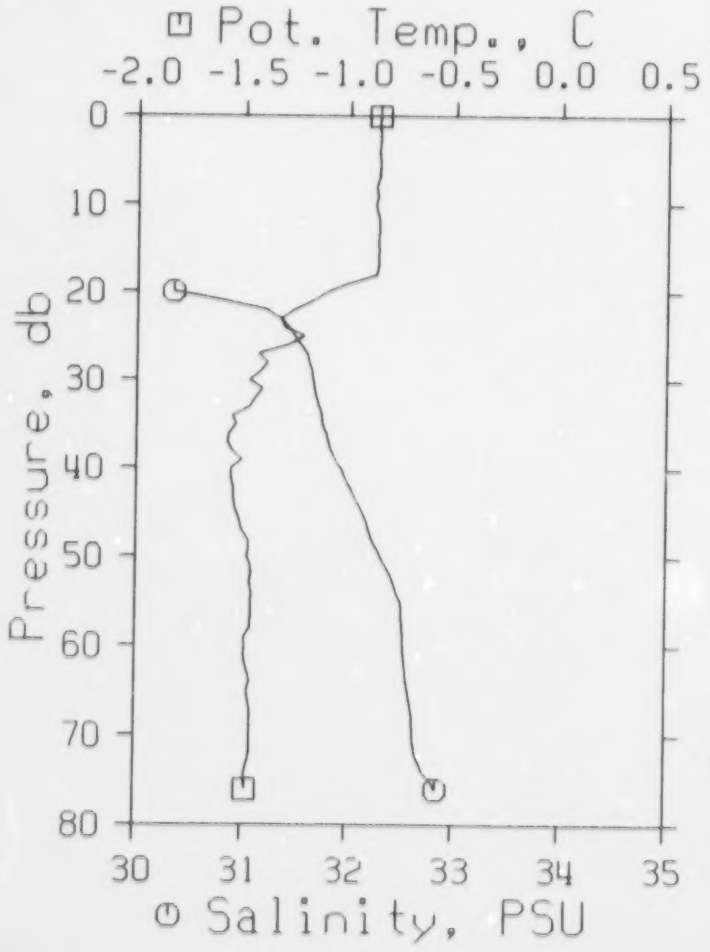
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-1.191	-1.191	30.865	24.83	313.1	.00	.00	1438
5	5	-1.209	-1.209	30.977	24.92	304.4	.15	.00	1438
10	10	-1.240	-1.240	31.118	25.04	293.4	.31	.02	1438
20	20	-1.277	-1.277	31.278	25.17	281.0	.60	.06	1438
30	30	-1.457	-1.458	32.914	26.50	154.4	.81	.11	1440
50	49	-1.454	-1.455	32.951	26.53	151.6	1.11	.24	1440

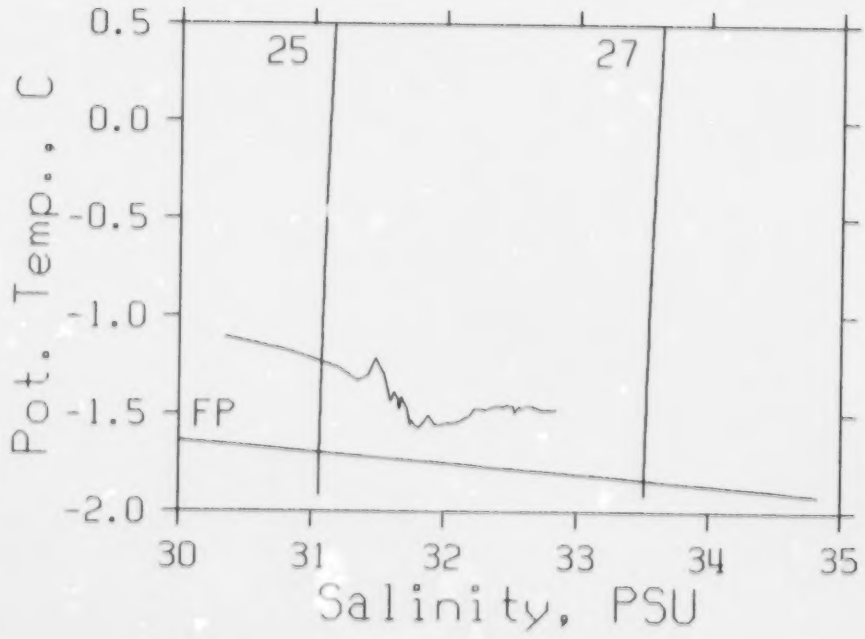




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L138
REFERENCE NO.: 91-70-045
DATE/TIME : 17/09/91 00:59 UTC
POSITION : 69-55.0N 139- 8.0W

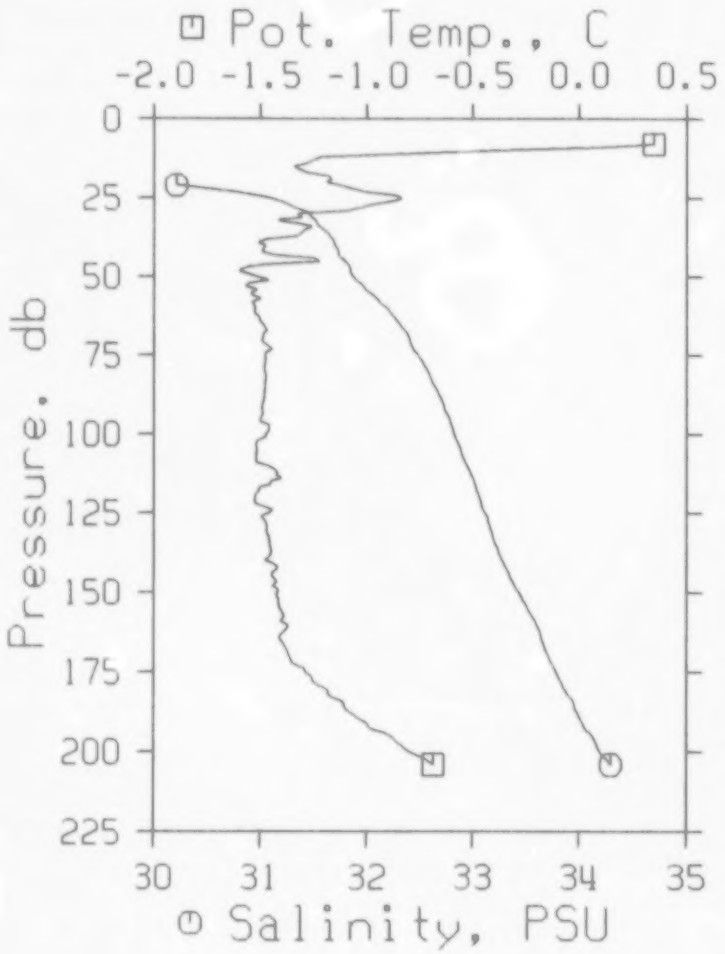
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.859	-.859	29.645	23.84	408.0	.00	.00	1438
5	5	-.858	-.858	29.640	23.83	408.4	.20	.01	1438
10	10	-.880	-.880	29.717	23.90	402.4	.41	.02	1438
20	20	-1.106	-1.106	30.340	24.41	353.8	.81	.08	1438
30	30	-1.472	-1.473	31.663	25.49	250.9	1.08	.15	1438
50	49	-1.479	-1.480	32.316	26.02	200.5	1.54	.33	1439
75	74	-1.480	-1.481	32.803	26.41	162.9	1.99	.62	1440
76	75	-1.477	-1.478	32.853	26.45	159.1	2.01	.63	1441

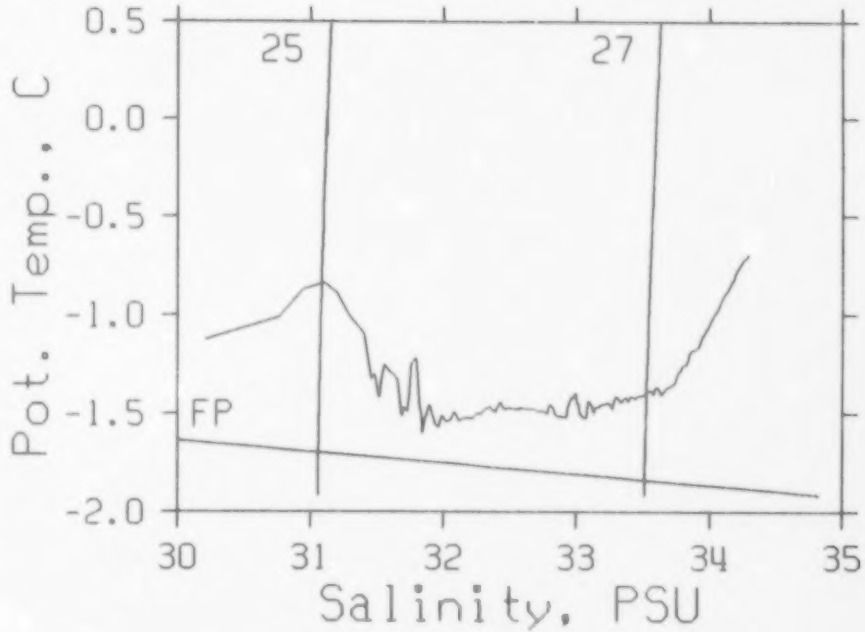




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L139
REFERENCE NO.: 91-70-048
DATE/TIME : 17/09/91 01:59 UTC
POSITION : 69-56.0N 138-50.5W

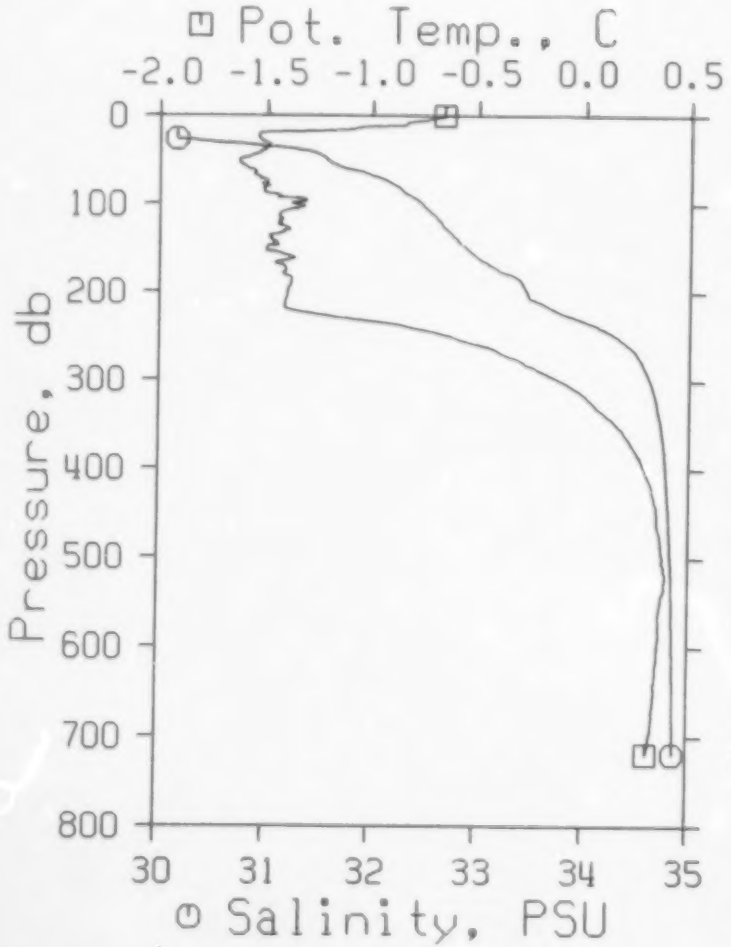
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.969	.969	16.439	13.17	1436.3	.00	.00	1429
5	5	.952	.952	16.555	13.26	1427.2	.72	.02	1429
10	10	-.468	-.468	23.173	18.60	910.2	1.35	.07	1431
11	11	-.714	-.714	24.902	20.00	775.6	1.40	.07	1432
20	20	-1.188	-1.188	29.923	24.07	385.8	1.91	.15	1437
30	30	-1.323	-1.324	31.459	25.32	266.9	2.22	.22	1439
50	49	-1.512	-1.513	31.873	25.66	234.6	2.71	.43	1439
75	74	-1.476	-1.477	32.479	26.15	187.9	3.23	.75	1440
100	99	-1.469	-1.471	32.827	26.43	161.1	3.66	1.14	1441
125	124	-1.453	-1.456	33.120	26.67	138.6	4.03	1.56	1442
150	148	-1.412	-1.415	33.434	26.92	114.5	4.35	2.00	1443
175	173	-1.282	-1.286	33.784	27.20	87.9	4.60	2.41	1444
200	198	-.795	-.801	34.190	27.51	58.4	4.78	2.76	1448
204	202	-.682	-.688	34.297	27.60	50.7	4.80	2.80	1448

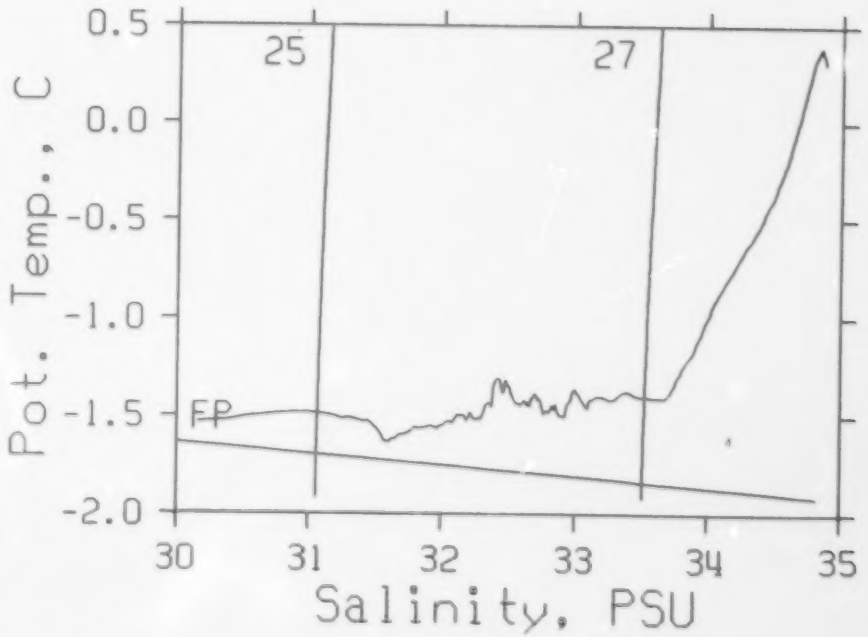




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : AM01
REFERENCE NO.: 91-70-049
DATE/TIME : 17/09/91 15:31 UTC
POSITION : 70-32.1N 139-58.3W

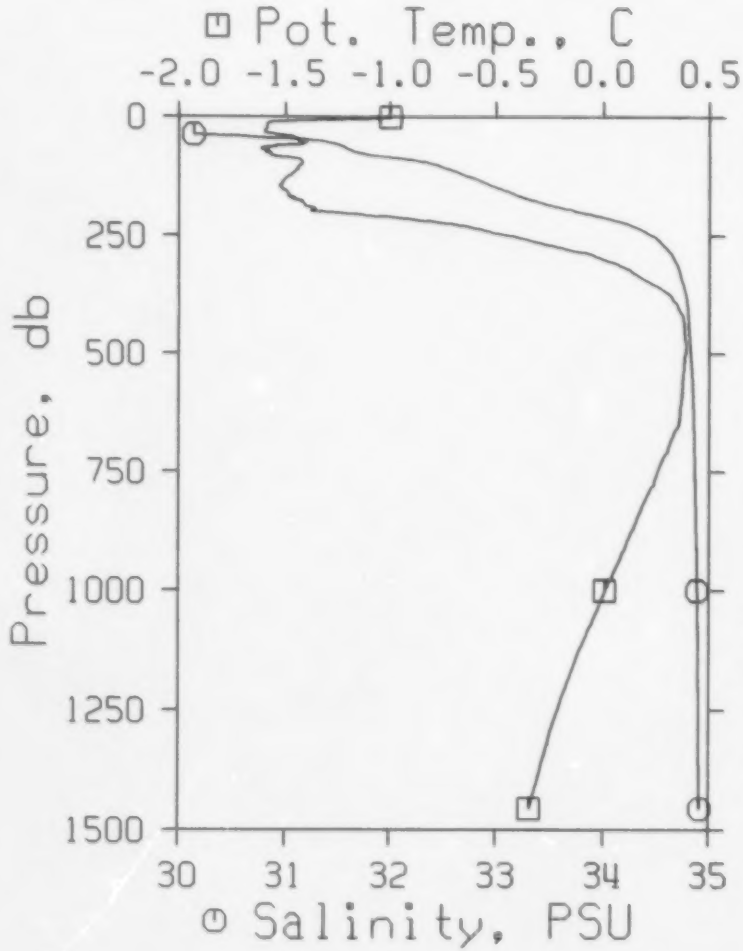
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.662	-.662	26.011	20.90	689.5	.00	.00	1434
5	5	-.755	-.755	27.021	21.71	611.1	.32	.01	1435
10	10	-.845	-.845	27.674	22.24	560.4	.62	.03	1436
20	20	-1.535	-1.535	29.593	23.81	410.8	1.11	.10	1435
30	30	-1.504	-1.504	30.529	24.57	338.4	1.49	.20	1437
50	49	-1.627	-1.628	31.575	25.42	257.4	2.05	.43	1438
75	74	-1.494	-1.495	32.158	25.89	212.6	2.64	.80	1440
100	99	-1.369	-1.371	32.467	26.14	189.1	3.14	1.24	1441
125	124	-1.412	-1.415	32.672	26.31	173.2	3.59	1.75	1441
150	148	-1.495	-1.498	32.894	26.49	155.9	4.00	2.32	1442
175	173	-1.400	-1.404	33.198	26.73	132.7	4.36	2.92	1443
200	198	-1.393	-1.398	33.462	26.94	112.4	4.65	3.48	1444
225	223	-1.250	-1.256	33.814	27.23	85.7	4.90	4.02	1445
250	247	-.619	-.627	34.308	27.60	50.1	5.06	4.41	1449
300	297	-.102	-.113	34.631	27.84	27.6	5.24	4.90	1453
400	396	.308	.291	34.783	27.94	18.1	5.46	5.67	1457
500	494	.405	.383	34.837	27.98	14.5	5.62	6.43	1459
600	593	.386	.359	34.859	28.00	12.7	5.76	7.21	1461
719	710	.342	.310	34.877	28.01	11.0	5.91	8.21	1462

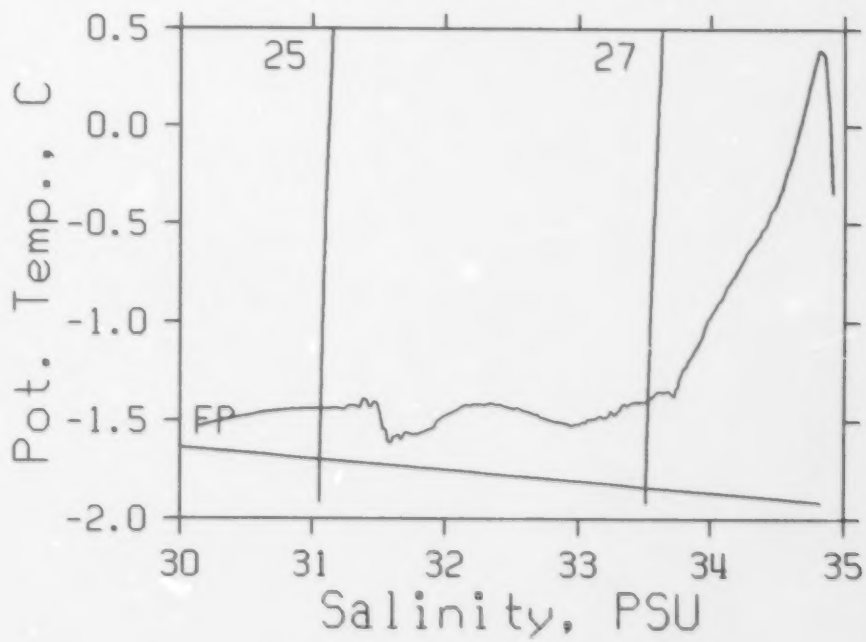




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L144
REFERENCE NO.: 91-70-050
DATE/TIME : 19/09/91 01:45 UTC
POSITION : 71-22.4N 141-23.1W

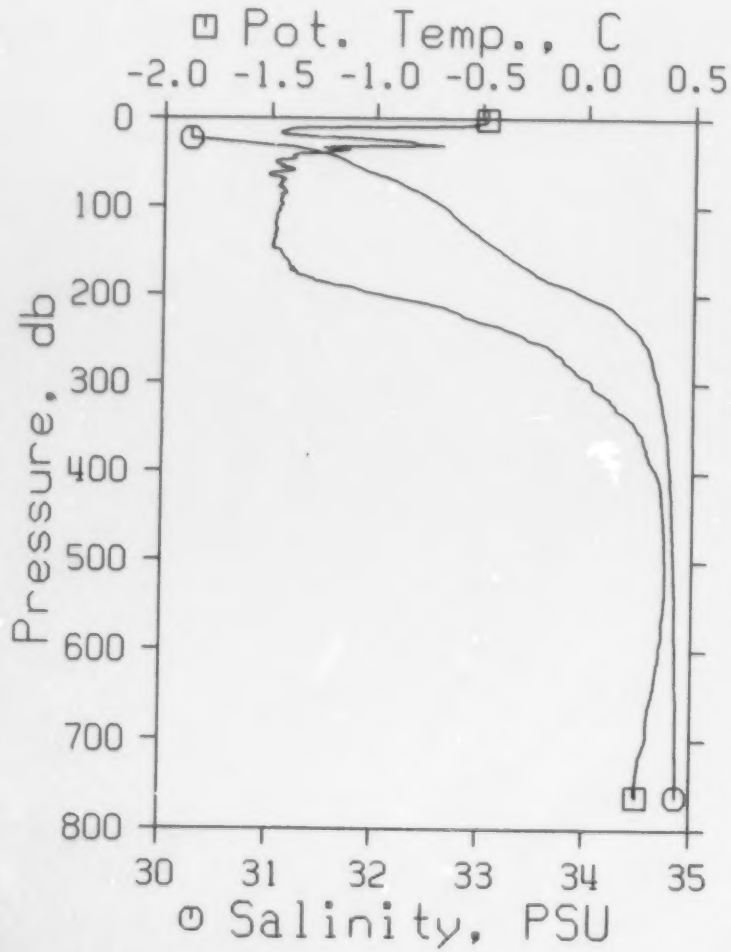
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.999	-.999	20.900	16.76	1087.5	.00	.00	1426
5	5	-1.152	-1.152	22.189	17.81	986.8	.53	.01	1427
6	6	-1.306	-1.306	24.898	20.00	775.5	.63	.02	1429
10	10	-1.551	-1.551	28.763	23.14	475.1	.85	.04	1434
20	20	-1.587	-1.587	29.522	23.75	416.2	1.28	.10	1435
30	30	-1.597	-1.597	29.561	23.78	413.2	1.69	.21	1435
50	49	-1.426	-1.427	31.322	25.21	277.3	2.38	.48	1438
75	74	-1.587	-1.588	31.678	25.50	249.5	3.03	.89	1438
100	99	-1.421	-1.423	32.427	26.11	192.1	3.58	1.38	1441
125	124	-1.484	-1.486	32.725	26.35	168.9	4.03	1.89	1441
150	148	-1.512	-1.515	33.022	26.59	146.0	4.42	2.43	1442
175	173	-1.419	-1.423	33.338	26.84	121.9	4.75	2.98	1443
200	198	-1.325	-1.330	33.760	27.18	89.7	5.01	3.48	1445
225	223	-.715	-.722	34.219	27.53	56.5	5.19	3.87	1448
250	247	-.427	-.435	34.461	27.72	39.2	5.31	4.15	1451
300	297	.005	-.006	34.670	27.86	25.2	5.46	4.57	1454
400	396	.369	.352	34.798	27.95	17.3	5.66	5.29	1457
500	494	.413	.391	34.831	27.97	15.0	5.83	6.05	1459
600	593	.399	.372	34.854	27.99	13.1	5.98	6.87	1461
800	790	.244	.208	34.875	28.02	10.6	6.23	8.65	1463
1000	987	.053	.008	34.894	28.04	8.1	6.42	10.41	1466
1200	1184	-.118	-.173	34.905	28.06	6.4	6.56	12.01	1468
1500	1479	-.294	-.364	34.920	28.08	4.4	6.71	13.95	1472

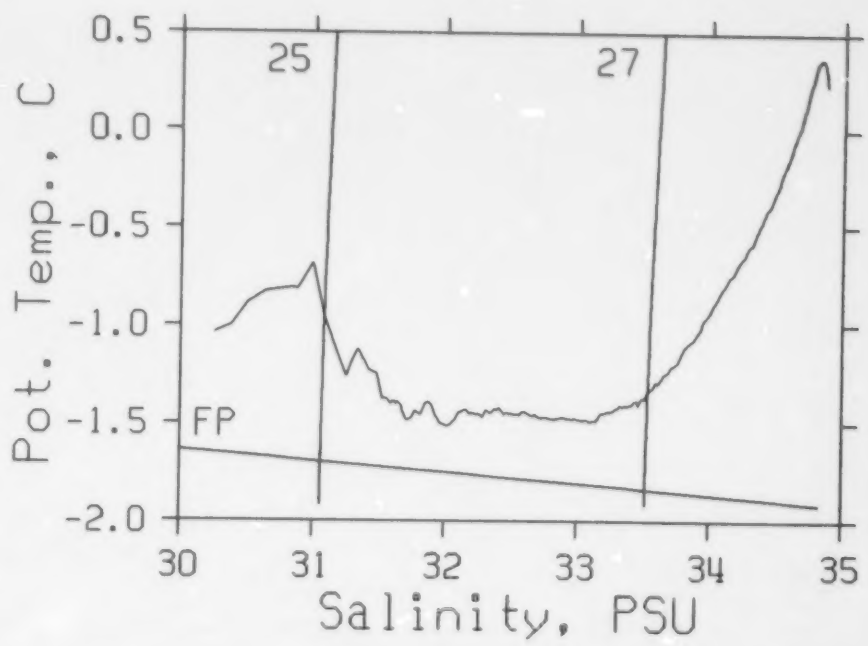




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : ALS1
REFERENCE NO.: 91-70-053
DATE/TIME : 24/09/91 16:20 UTC
POSITION : 70-34.0N 136-54.4W

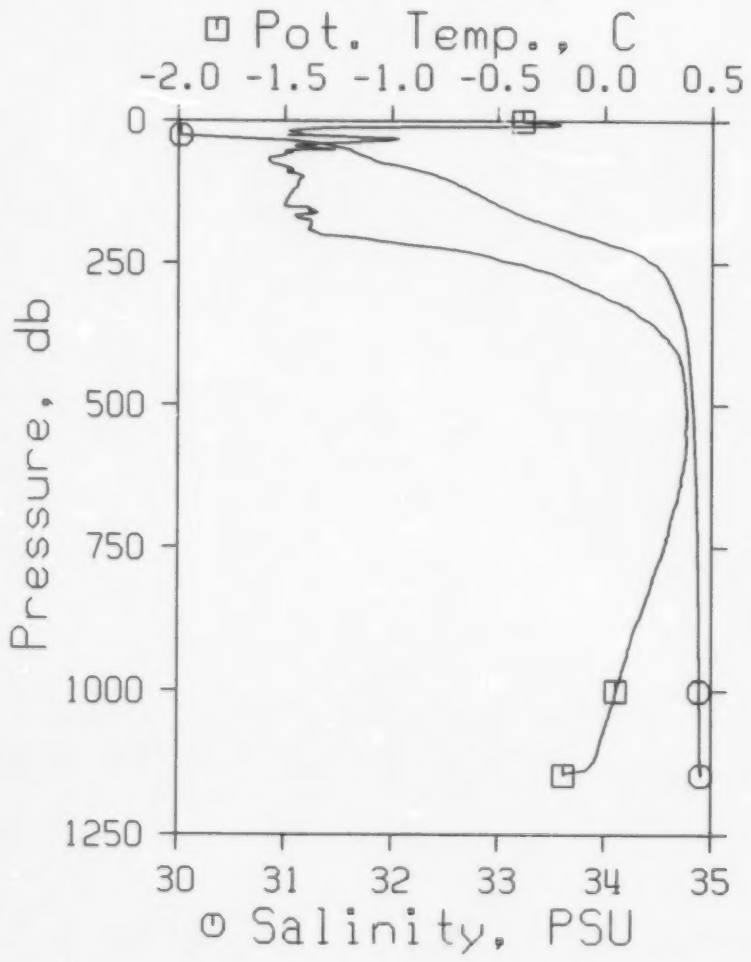
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.480	-.480	17.835	14.29	1327.2	.00	.00	1424
5	5	-.500	-.500	18.216	14.60	1297.3	.66	.02	1424
10	10	-1.190	-1.191	24.898	20.00	775.7	1.23	.06	1430
10	10	-1.297	-1.297	25.817	20.74	704.0	1.25	.06	1431
20	20	-1.356	-1.356	29.398	23.65	426.1	1.76	.14	1436
30	30	-.685	-.686	30.992	24.92	304.6	2.11	.22	1441
50	49	-1.477	-1.478	31.735	25.55	245.3	2.63	.44	1439
75	74	-1.451	-1.452	32.253	25.97	205.4	3.20	.79	1440
100	99	-1.455	-1.457	32.642	26.28	175.4	3.67	1.21	1441
125	124	-1.469	-1.472	32.883	26.48	156.8	4.08	1.69	1441
150	148	-1.448	-1.451	33.185	26.72	133.6	4.44	2.19	1442
175	173	-1.374	-1.378	33.502	26.98	109.4	4.75	2.69	1444
200	198	-.965	-.970	33.967	27.34	74.9	4.98	3.12	1447
225	223	-.573	-.580	34.326	27.61	48.9	5.12	3.44	1449
250	247	-.275	-.284	34.517	27.76	35.6	5.23	3.69	1451
300	297	.035	.024	34.669	27.86	25.4	5.37	4.10	1454
400	396	.344	.327	34.785	27.94	18.1	5.59	4.85	1457
500	494	.394	.372	34.825	27.97	15.3	5.76	5.63	1459
600	593	.375	.349	34.850	27.99	13.3	5.90	6.45	1460
800	790	.289	.253	34.881	28.02	10.4	6.15	8.22	1463

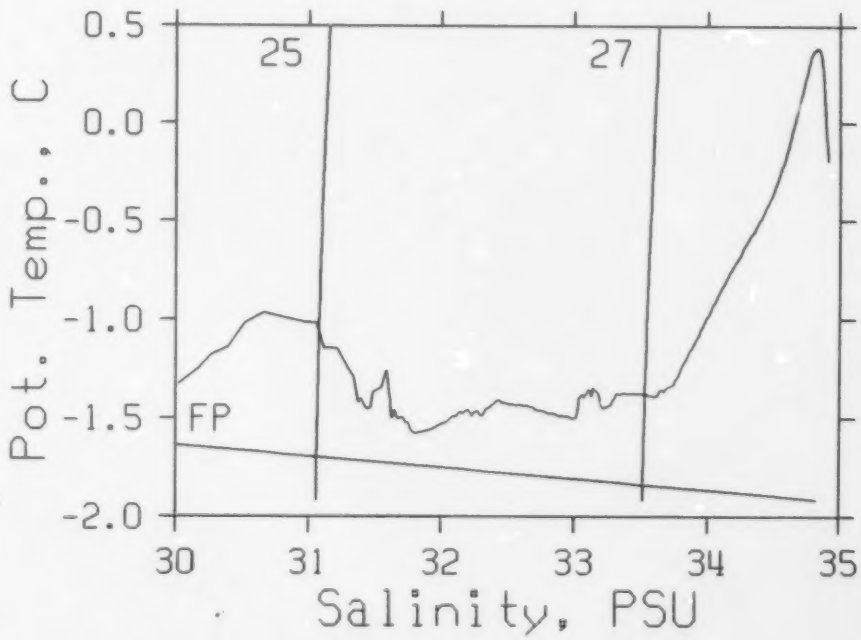




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : ALS2
REFERENCE NO.: 91-70-054
DATE/TIME : 25/09/91 02:26 UTC
POSITION : 70-33.6N 138-10.5W

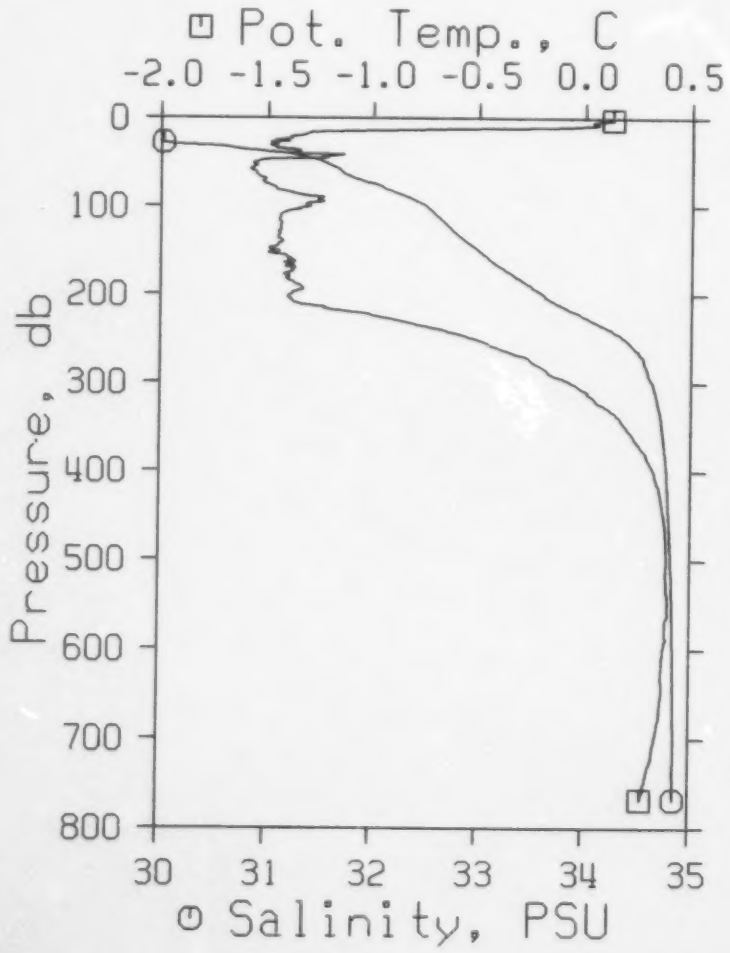
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.385	-.385	12.851	10.27	1719.7	.00	.00	1418
5	5	-.212	-.212	13.380	10.70	1677.4	.85	.02	1419
10	10	-.729	-.729	18.243	14.62	1295.4	1.67	.08	1423
11	11	-1.239	-1.239	24.899	20.00	775.5	1.81	.10	1430
20	20	-1.444	-1.444	29.584	23.80	411.6	2.24	.17	1435
30	30	-1.016	-1.017	30.530	24.56	339.3	2.62	.26	1439
50	49	-1.397	-1.398	31.614	25.45	254.8	3.18	.49	1439
75	74	-1.553	-1.554	31.945	25.72	228.9	3.79	.87	1439
100	99	-1.422	-1.424	32.474	26.14	188.4	4.30	1.33	1441
125	124	-1.463	-1.466	32.767	26.38	165.7	4.74	1.83	1441
150	148	-1.467	-1.470	33.030	26.60	145.5	5.13	2.37	1442
175	173	-1.372	-1.376	33.363	26.86	120.1	5.46	2.91	1443
200	198	-1.303	-1.308	33.762	27.19	89.6	5.72	3.41	1445
225	223	-.716	-.723	34.208	27.53	57.3	5.90	3.80	1448
250	247	-.403	-.411	34.463	27.72	39.1	6.02	4.08	1451
300	297	-.038	-.049	34.643	27.85	27.0	6.17	4.52	1453
400	396	.347	.330	34.782	27.94	18.4	6.39	5.29	1457
500	494	.407	.385	34.827	27.97	15.3	6.57	6.07	1459
600	593	.401	.374	34.851	27.99	13.4	6.71	6.89	1461
800	790	.266	.230	34.880	28.02	10.4	6.96	8.65	1463
1000	987	.100	.055	34.893	28.04	8.5	7.16	10.45	1466
1200	1184	-.874	-.921	34.958	28.14	-.9	7.28	11.77	1465

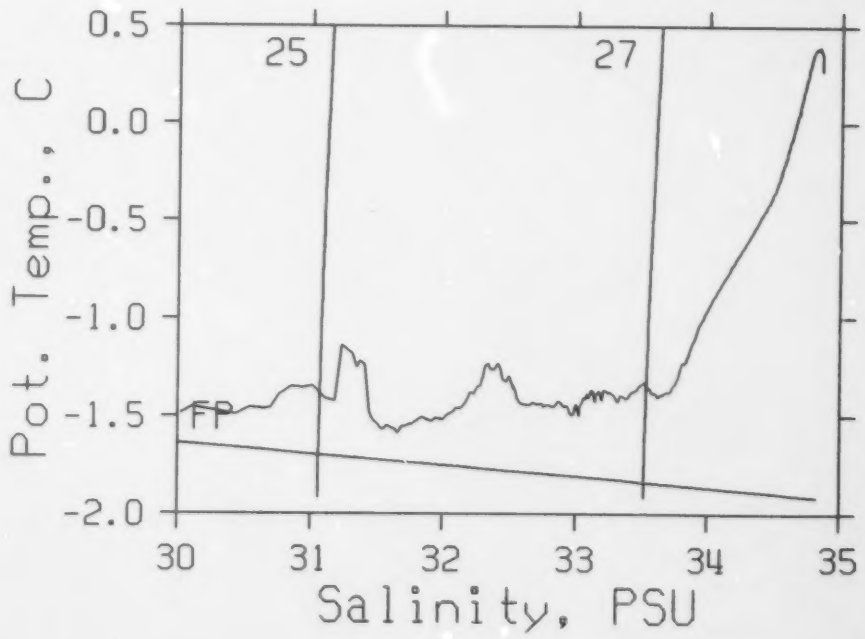




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : ALS4
REFERENCE NO.: 91-70-055
DATE/TIME : 25/09/91 13:13 UTC
POSITION : 70-34.1N 140- .1W

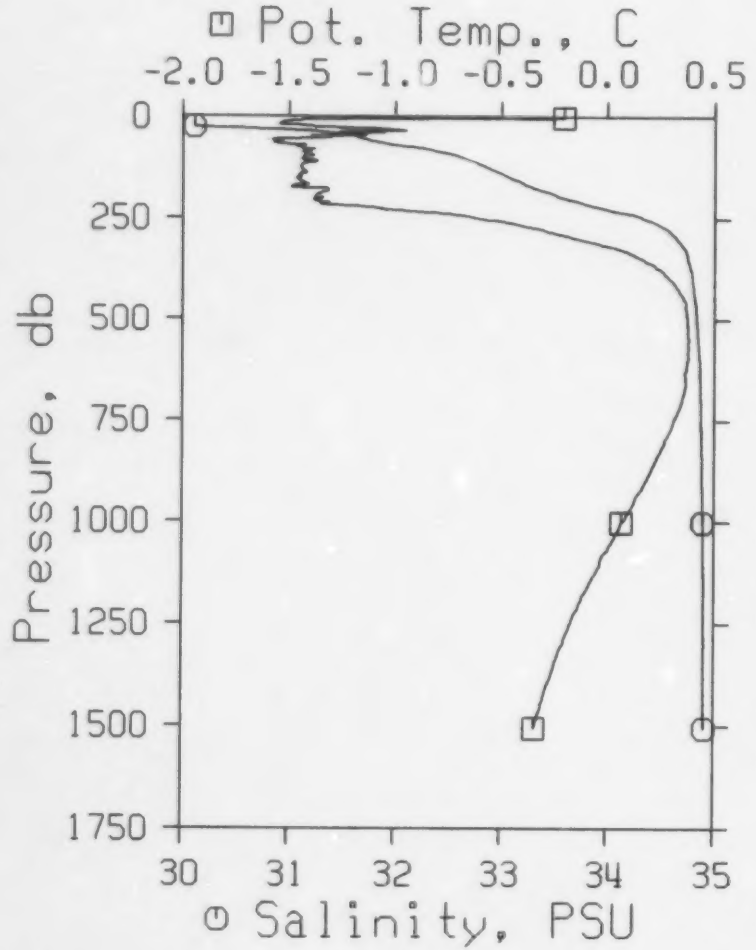
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.126	.126	15.036	12.04	1546.4	.00	.00	1423
5	5	.031	.031	15.095	12.09	1541.9	.77	.02	1423
10	10	-.163	-.163	22.399	17.97	970.7	1.40	.07	1432
13	12	-.732	-.733	24.903	20.00	775.5	1.63	.09	1432
20	20	-1.353	-1.353	28.986	23.31	458.0	2.06	.16	1435
30	30	-1.468	-1.468	30.238	24.33	361.0	2.46	.26	1436
50	49	-1.560	-1.561	31.531	25.38	260.9	3.05	.50	1438
75	74	-1.492	-1.493	32.042	25.80	221.6	3.66	.89	1439
100	99	-1.297	-1.299	32.505	26.17	186.4	4.17	1.34	1441
125	124	-1.434	-1.437	32.736	26.36	168.2	4.61	1.84	1441
150	148	-1.450	-1.453	32.997	26.57	148.1	5.00	2.39	1442
175	173	-1.394	-1.398	33.291	26.81	125.6	5.35	2.95	1443
200	198	-1.386	-1.391	33.613	27.07	100.8	5.62	3.49	1444
225	223	-.958	-.964	33.996	27.36	72.7	5.84	3.95	1447
250	247	-.513	-.521	34.377	27.65	45.2	5.98	4.30	1450
300	297	-.051	-.062	34.636	27.84	27.5	6.15	4.77	1453
400	396	.344	.327	34.774	27.93	19.0	6.38	5.56	1457
500	494	.413	.391	34.821	27.96	15.8	6.56	6.37	1459
600	593	.403	.376	34.845	27.98	13.8	6.71	7.23	1461
800	790	.266	.230	34.859	28.00	12.0	6.98	9.15	1463

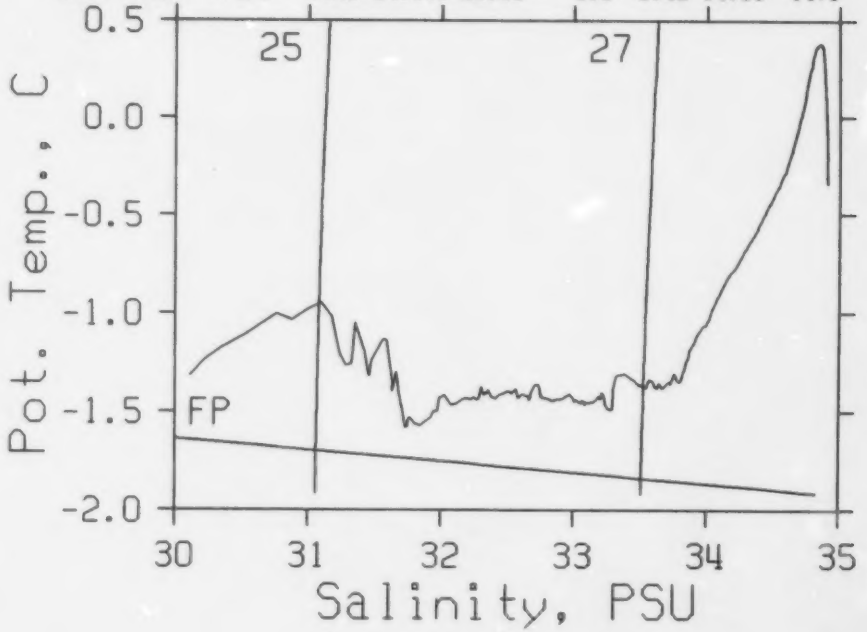




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L143
REFERENCE NO.: 91-70-056
DATE/TIME : 25/09/91 21:44 UTC
POSITION : 70-51.9N 139-32.2W

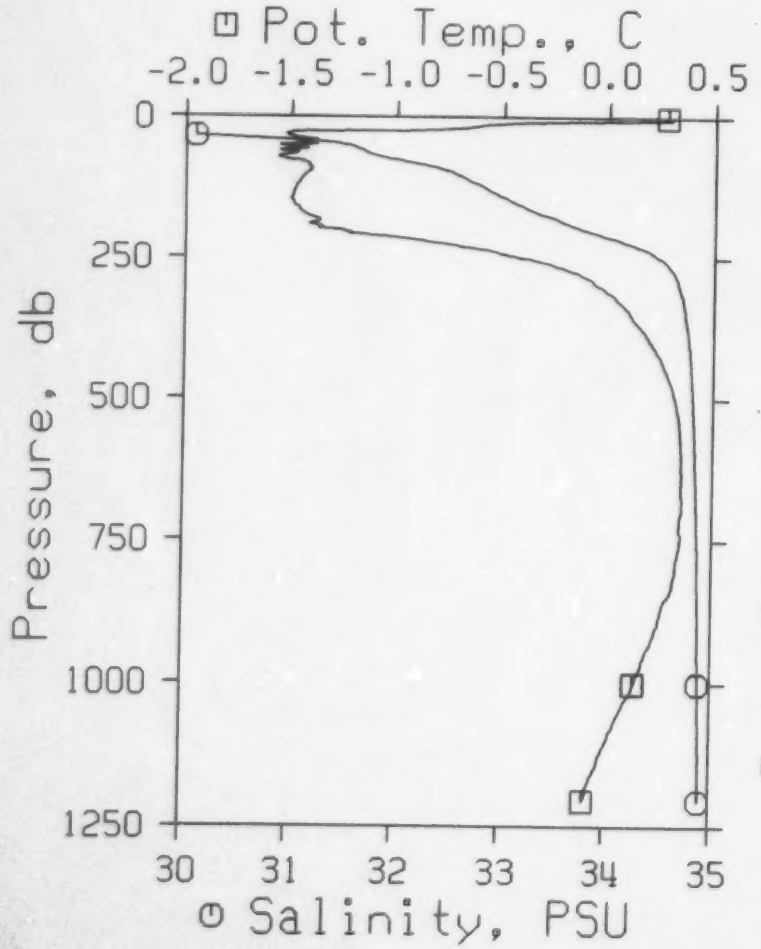
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.204	-.204	20.140	16.15	1146.7	.00	.00	1428
5	5	-.927	-.927	24.900	20.00	775.6	.50	.01	1431
5	5	-1.111	-1.111	25.982	20.88	691.3	.52	.01	1432
10	10	-1.477	-1.477	28.416	22.85	502.1	.81	.03	1433
20	20	-1.454	-1.454	29.405	23.65	425.5	1.26	.10	1435
30	30	-1.057	-1.058	30.652	24.66	329.8	1.64	.20	1439
50	49	-1.333	-1.334	31.649	25.47	252.3	2.19	.42	1439
75	74	-1.429	-1.430	32.188	25.91	210.5	2.78	.79	1440
100	99	-1.408	-1.410	32.624	26.26	176.9	3.26	1.22	1441
125	124	-1.437	-1.440	32.870	26.47	157.9	3.67	1.69	1442
150	148	-1.454	-1.457	33.081	26.64	141.6	4.05	2.21	1442
175	173	-1.383	-1.387	33.306	26.82	124.4	4.37	2.75	1443
200	198	-1.340	-1.345	33.596	27.05	102.2	4.65	3.28	1444
225	223	-1.069	-1.075	33.966	27.34	74.6	4.87	3.75	1446
250	247	-.604	-.612	34.347	27.63	47.1	5.02	4.11	1450
300	297	-.128	-.139	34.654	27.86	25.8	5.18	4.57	1453
400	396	.311	.294	34.796	27.95	17.1	5.38	5.27	1457
500	494	.397	.375	34.837	27.98	14.4	5.54	6.00	1459
600	593	.406	.379	34.868	28.00	12.1	5.68	6.78	1461
800	790	.306	.270	34.884	28.02	10.3	5.92	8.47	1463
1000	987	.118	.072	34.899	28.04	8.1	6.12	10.24	1466
1200	1184	-.074	-.129	34.909	28.06	6.3	6.26	11.86	1468
1500	1479	-.267	-.337	34.913	28.08	5.0	6.42	13.97	1473
1506	1485	-.271	-.342	34.913	28.08	5.0	6.42	14.00	1473

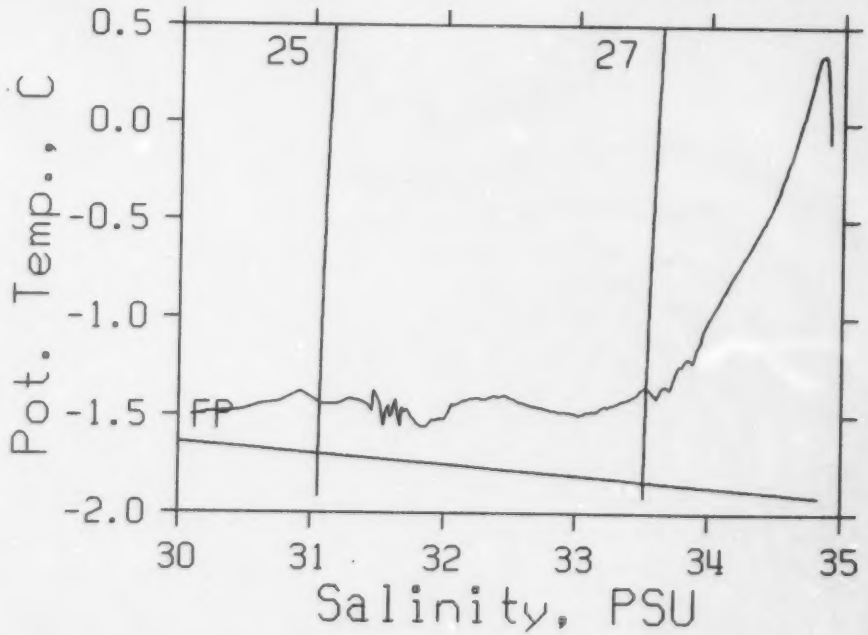




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L142
REFERENCE NO.: 91-70-057
DATE/TIME : 26/09/91 01:41 UTC
POSITION : 70-40.0N 139-30.1W

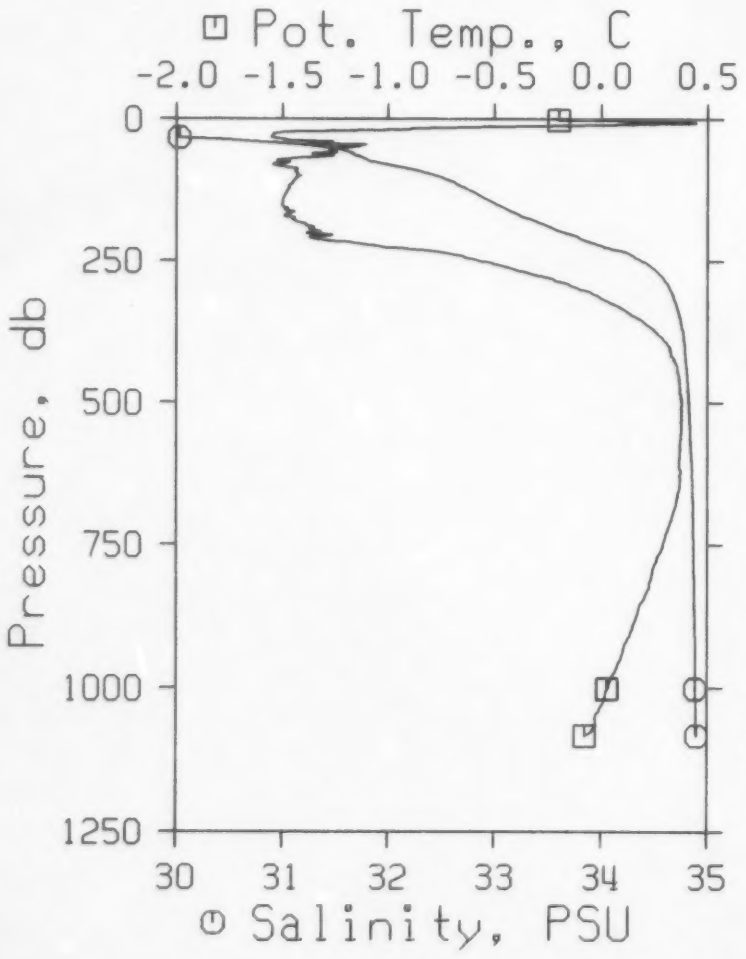
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.275	.275	14.720	11.79	1571.1	.00	.00	1423
5	5	.205	.205	16.398	13.14	1439.4	.78	.02	1425
10	10	-.451	-.451	24.612	19.76	798.4	1.30	.06	1433
11	11	-.478	-.478	24.907	20.00	775.5	1.37	.07	1434
20	20	-.736	-.736	26.658	21.42	639.3	2.00	.16	1435
30	30	-1.525	-1.525	29.747	23.93	398.9	2.53	.30	1435
50	49	-1.552	-1.553	31.548	25.40	259.6	3.17	.55	1438
75	74	-1.519	-1.520	31.964	25.73	227.5	3.78	.94	1439
100	99	-1.425	-1.427	32.542	26.20	183.2	4.28	1.38	1441
125	124	-1.474	-1.477	32.823	26.43	161.4	4.71	1.87	1441
150	148	-1.481	-1.484	33.078	26.64	141.7	5.09	2.40	1442
175	173	-1.417	-1.421	33.400	26.90	117.1	5.41	2.93	1443
200	198	-1.246	-1.251	33.777	27.20	88.6	5.67	3.42	1445
225	223	-.751	-.758	34.217	27.53	56.5	5.85	3.80	1448
250	247	-.400	-.408	34.497	27.75	36.5	5.96	4.07	1451
300	297	-.033	-.044	34.671	27.87	24.9	6.10	4.47	1453
400	396	.220	.204	34.770	27.93	18.6	6.31	5.22	1456
500	494	.343	.322	34.811	27.96	16.1	6.49	6.02	1459
600	593	.381	.355	34.836	27.98	14.4	6.65	6.91	1460
800	790	.368	.331	34.868	28.00	11.8	6.92	8.85	1464
1000	987	.186	.140	34.887	28.03	9.4	7.15	10.90	1466
1200	1184	-.036	-.091	34.903	28.06	7.0	7.31	12.74	1469
1205	1189	-.041	-.097	34.903	28.06	6.9	7.31	12.78	1469

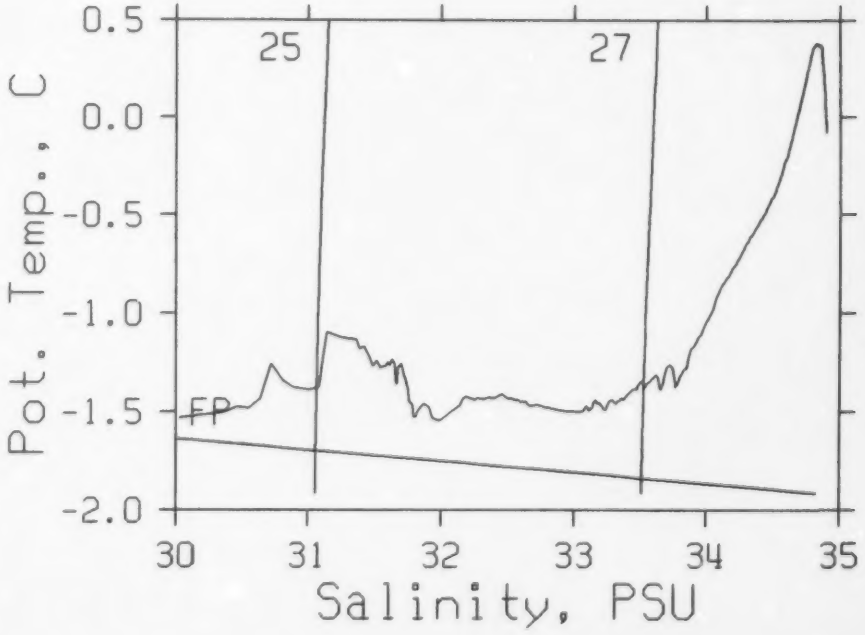




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L145
REFERENCE NO.: 91-70-058
DATE/TIME : 26/09/91 03:10 UTC
POSITION : 70-34.0N 139-30.1W

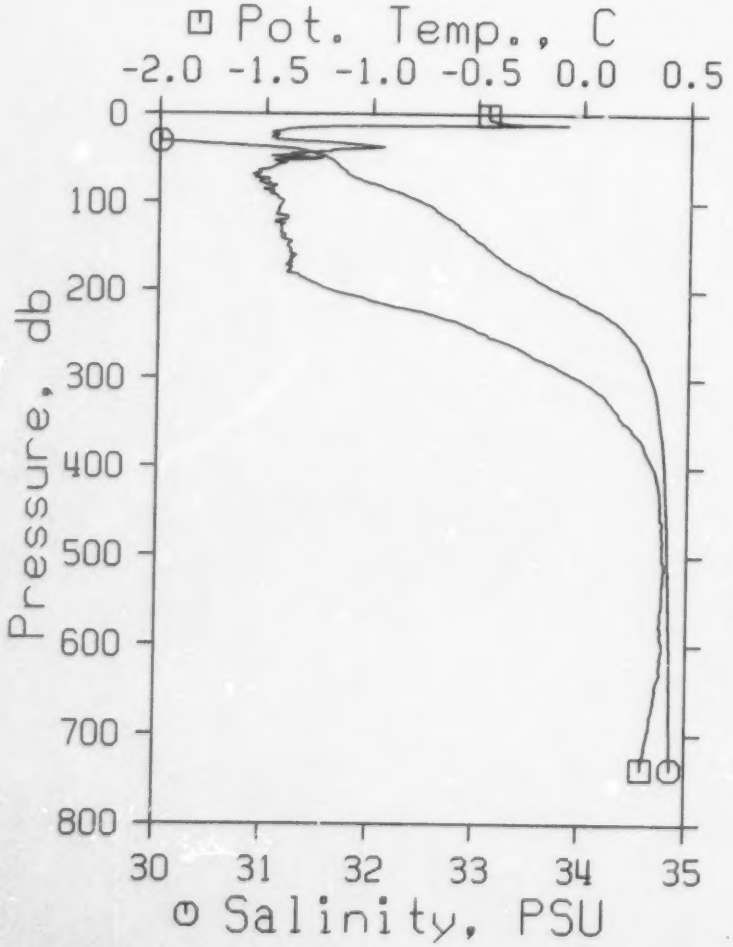
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.201	-.201	13.852	11.08	1640.2	.00	.00	1420
5	5	.690	.690	16.118	12.91	1461.3	.79	.02	1427
10	10	-.026	-.026	20.833	16.71	1092.7	1.44	.07	1430
13	13	-.517	-.518	24.906	20.00	775.5	1.75	.10	1433
20	20	-1.180	-1.180	27.950	22.47	538.5	2.18	.18	1434
30	30	-1.542	-1.542	29.807	23.98	394.2	2.61	.29	1435
50	49	-1.222	-1.223	31.464	25.32	266.8	3.26	.54	1439
75	74	-1.462	-1.463	31.870	25.66	234.9	3.88	.94	1439
100	99	-1.414	-1.416	32.470	26.14	188.8	4.40	1.40	1441
125	124	-1.475	-1.477	32.770	26.39	165.5	4.84	1.90	1441
150	148	-1.497	-1.500	33.022	26.59	146.0	5.23	2.44	1442
175	173	-1.454	-1.458	33.325	26.84	122.8	5.56	2.99	1443
200	198	-1.383	-1.388	33.664	27.11	96.9	5.83	3.51	1444
225	223	-1.001	-1.007	34.036	27.40	69.5	6.04	3.96	1447
250	247	-.552	-.560	34.391	27.67	44.0	6.17	4.28	1450
300	297	-.083	-.094	34.653	27.86	26.0	6.33	4.73	1453
400	396	.340	.323	34.791	27.94	17.7	6.54	5.47	1457
500	494	.404	.382	34.829	27.97	15.1	6.71	6.23	1459
600	593	.396	.369	34.855	27.99	13.0	6.86	7.05	1461
800	790	.277	.241	34.877	28.02	10.7	7.11	8.82	1463
1000	987	.077	.032	34.894	28.04	8.3	7.31	10.62	1466
1083	1069	-.030	-.079	34.901	28.05	7.2	7.37	11.32	1467

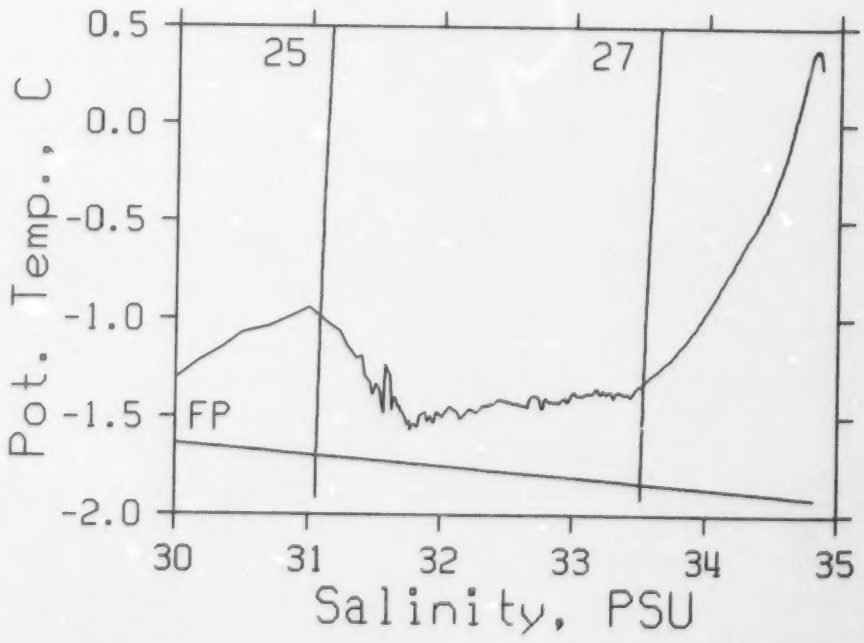




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L141
REFERENCE NO.: 91-70-059
DATE/TIME : 26/09/91 05:10 UTC
POSITION : 70-25.8N 139- 6.0W

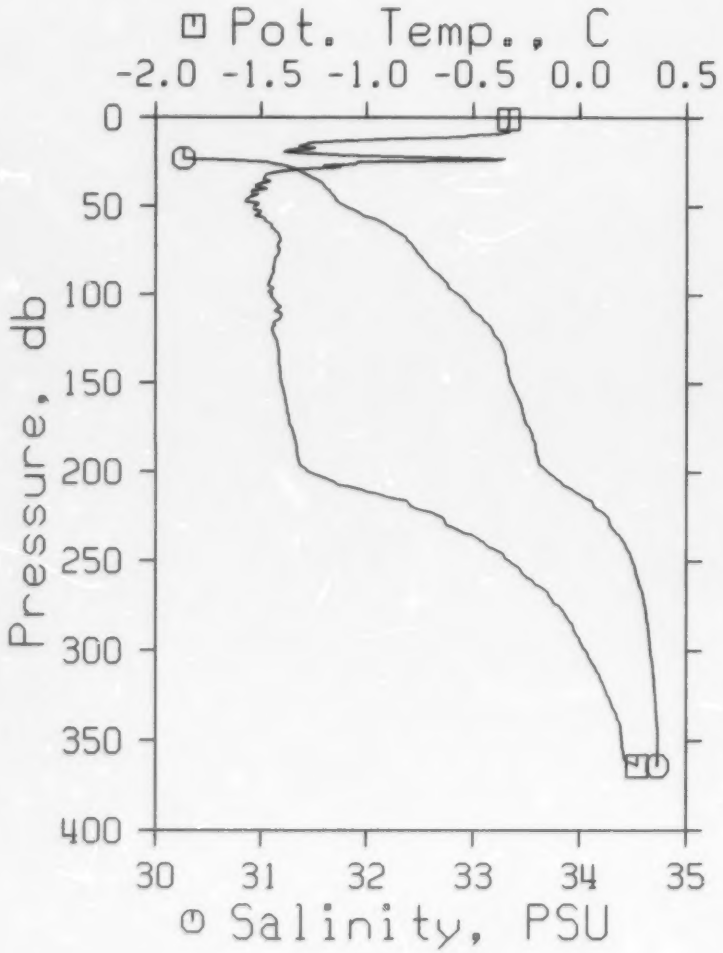
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.452	-.452	13.628	10.90	1658.4	.00	.00	1418
5	5	-.444	-.444	13.620	10.89	1659.0	.83	.02	1419
10	10	-.350	-.350	14.389	11.51	1598.1	1.65	.08	1420
14	14	-1.194	-1.194	24.899	20.00	775.5	2.16	.15	1430
20	20	-1.452	-1.452	28.947	23.28	460.9	2.50	.20	1434
30	30	-1.356	-1.356	29.832	24.00	392.6	2.92	.31	1436
50	49	-1.233	-1.234	31.577	25.41	258.1	3.51	.55	1440
75	74	-1.522	-1.523	31.900	25.68	232.5	4.12	.94	1439
100	99	-1.414	-1.416	32.470	26.14	188.8	4.65	1.40	1441
125	124	-1.416	-1.419	32.819	26.42	161.9	5.08	1.89	1442
150	148	-1.390	-1.393	33.078	26.63	142.0	5.46	2.42	1442
175	173	-1.377	-1.381	33.368	26.87	119.7	5.79	2.96	1443
200	198	-1.181	-1.186	33.767	27.19	89.6	6.04	3.45	1445
225	223	-.740	-.747	34.197	27.52	58.1	6.23	3.85	1448
250	247	-.444	-.452	34.445	27.71	40.3	6.35	4.13	1450
300	297	.005	-.006	34.663	27.86	25.7	6.50	4.57	1454
400	396	.363	.346	34.790	27.94	17.9	6.71	5.31	1457
500	494	.410	.388	34.824	27.97	15.5	6.88	6.09	1459
600	593	.417	.390	34.850	27.99	13.5	7.03	6.93	1461
800	790	.319	.283	34.874	28.01	11.1	7.29	8.76	1464

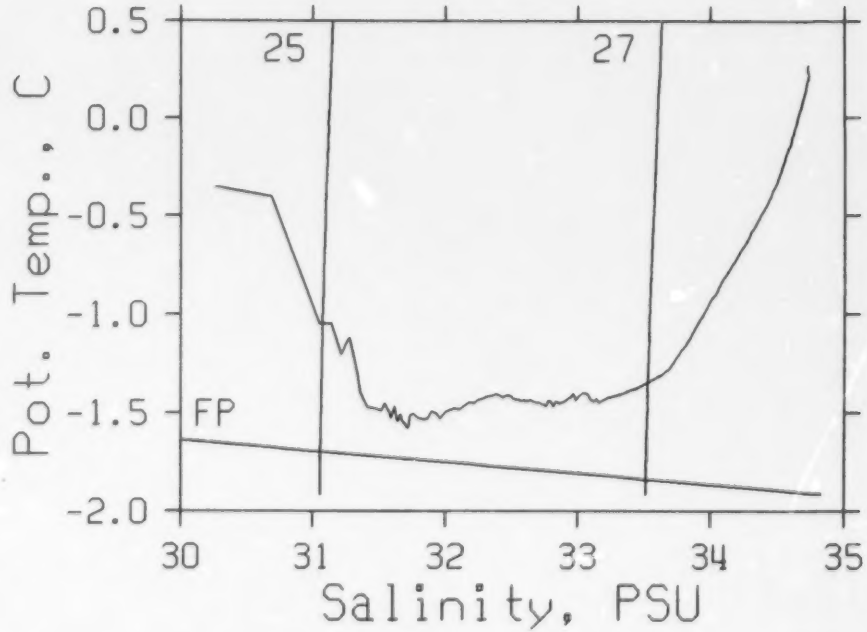




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : L140
REFERENCE NO.: 91-70-060
DATE/TIME : 26/09/91 08:05 UTC
POSITION : 70- 9.9N 138-47.7W

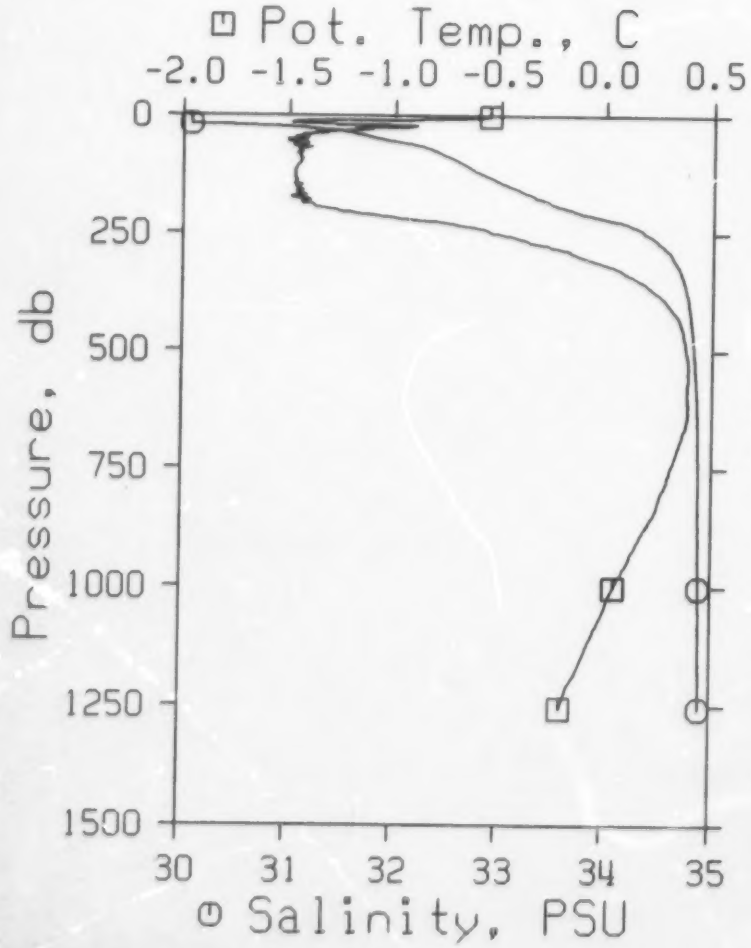
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.337	-.337	13.638	10.91	1657.3	.00	.00	1419
5	5	-.338	-.338	13.617	10.89	1659.0	.83	.02	1419
10	10	-.513	-.513	24.391	19.58	815.4	1.58	.08	1433
11	10	-.533	-.533	24.906	20.00	775.5	1.62	.08	1433
20	20	-1.309	-1.309	29.611	23.82	409.7	2.14	.16	1436
30	30	-1.403	-1.404	31.370	25.25	273.6	2.47	.24	1438
50	49	-1.529	-1.530	31.799	25.60	240.3	2.98	.45	1438
75	74	-1.412	-1.413	32.470	26.14	188.8	3.50	.78	1440
100	99	-1.452	-1.454	32.861	26.46	158.5	3.93	1.16	1441
125	124	-1.426	-1.429	33.223	26.75	130.7	4.29	1.57	1442
150	148	-1.397	-1.400	33.352	26.86	120.9	4.60	2.00	1443
175	173	-1.349	-1.353	33.520	26.99	108.1	4.88	2.47	1444
200	198	-1.267	-1.272	33.705	27.14	94.1	5.14	2.95	1445
225	223	-.644	-.651	34.263	27.57	53.4	5.32	3.34	1449
250	247	-.321	-.330	34.505	27.75	36.3	5.43	3.61	1451
300	297	.042	.031	34.670	27.86	25.4	5.57	4.01	1454
364	360	.289	.274	34.738	27.91	21.4	5.72	4.50	1456

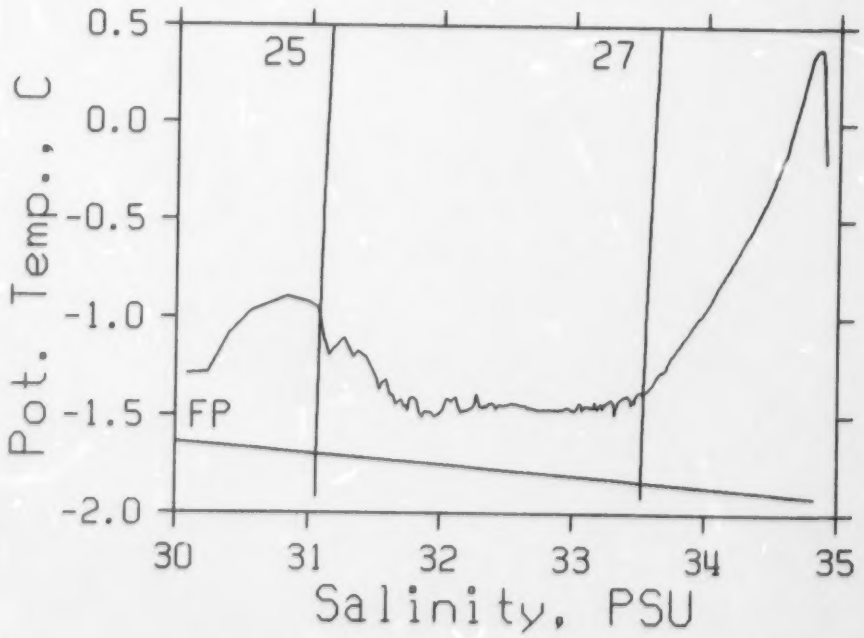




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : RD11
REFERENCE NO.: 91-70-061
DATE/TIME : 26/09/91 14:38 UTC
POSITION : 70-40.1N 136-59.5

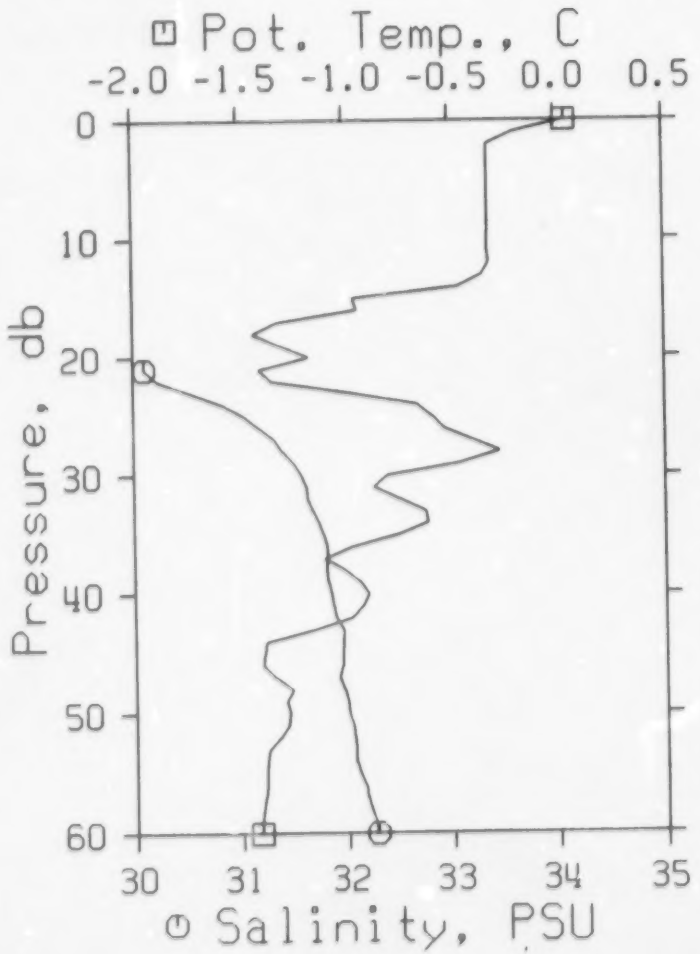
PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	-.551	-.551	14.860	11.89	1561.3	.00	.00	1420
5	5	-.617	-.617	15.892	12.72	1480.1	.77	.02	1421
10	10	-1.200	-1.200	24.897	20.00	775.9	1.34	.06	1430
10	10	-1.294	-1.294	26.435	21.25	656.0	1.36	.06	1432
20	20	-1.080	-1.080	30.405	24.46	348.8	1.79	.13	1438
30	30	-1.175	-1.176	31.373	25.25	273.9	2.09	.20	1439
50	49	-1.508	-1.509	31.865	25.65	235.2	2.59	.41	1439
75	74	-1.438	-1.439	32.371	26.06	196.3	3.12	.74	1440
100	99	-1.447	-1.449	32.620	26.26	177.1	3.59	1.15	1441
125	124	-1.470	-1.473	32.831	26.43	160.8	4.01	1.64	1441
150	148	-1.468	-1.471	33.073	26.63	142.2	4.38	2.16	1442
175	173	-1.453	-1.457	33.332	26.84	122.2	4.71	2.70	1443
200	198	-1.273	-1.278	33.667	27.11	97.0	4.98	3.22	1445
225	223	-.804	-.811	34.129	27.47	63.1	5.18	3.65	1448
250	247	-.524	-.532	34.368	27.65	45.9	5.31	3.96	1450
300	297	-.107	-.118	34.626	27.84	28.0	5.49	4.45	1453
400	396	.306	.289	34.780	27.94	18.3	5.71	5.23	1457
500	494	.401	.379	34.831	27.97	14.9	5.88	6.00	1459
600	593	.414	.387	34.862	28.00	12.6	6.02	6.80	1461
800	790	.304	.268	34.881	28.02	10.5	6.27	8.53	1463
1000	987	.097	.052	34.891	28.04	8.6	6.47	10.39	1466
1200	1184	-.098	-.153	34.903	28.06	6.6	6.62	12.12	1468
1255	1239	-.141	-.198	34.904	28.06	6.4	6.66	12.55	1469

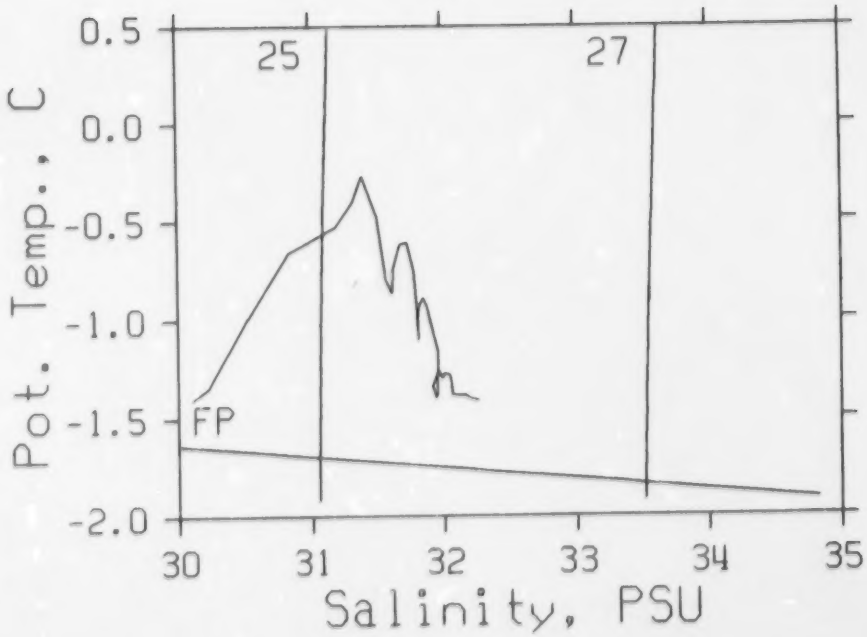




NOGAP SUMMER 1991
Larsen Cruise 91-70
STATION : RD12
REFERENCE NO.: 91-70-062
DATE/TIME : 26/09/91 20:54 UTC
POSITION : 70-28.2N 136-13.4W

PRESS	DEPTH	TEMP	THETA	SAL	SIGMA T	SVAN	DYN. HT.	POT. EN.	SOUND SPEED
0	0	.048	.048	23.378	18.76	894.9	.00	.00	1434
5	5	-.317	-.317	23.727	19.05	867.3	.44	.01	1433
10	10	-.320	-.320	24.088	19.34	839.2	.87	.04	1433
12	12	-.313	-.314	24.910	20.00	775.5	1.03	.06	1434
20	20	-1.174	-1.174	29.806	23.98	394.9	1.44	.13	1437
30	30	-.798	-.799	31.577	25.40	259.2	1.75	.21	1441
50	49	-1.275	-1.276	32.010	25.76	224.6	2.23	.40	1440
60	59	-1.410	-1.411	32.276	25.98	203.7	2.44	.52	1440





5 APPENDIX 2; CHEMICAL DATA TABLES

STATION : L100 DATE : 14/09/91 TIME : 0832(Z-6)
DEPTH : 22m
LATITUDE : 69 08.1 N LONGITUDE : 137 43.4 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q1	3.45	4.435	401.5	0.40	48.8	2.5
10	Q2	-1.33	30.024	401.1	0.77	9.1	1.8
15	Q3	-1.50	30.982	390.4	0.84	11.3	2.5
20	Q4	-1.54	31.352	378.7	0.87	12.4	3.0

STATION : L101 DATE : 14/09/91 TIME : 1159(Z-6)
DEPTH : 38m
LATITUDE : 69 17.2 N LONGITUDE : 127 52.7 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q5	2.68	9.621	394.4	0.34	41.0	3.0
5	Q6	-0.04	24.298	362.8	0.59	18.2	3.8
10	Q7	-1.38	30.091	402.6	0.79	8.7	1.5
20	Q8	-1.54	31.355	374.4	0.88	12.9	3.7
30	Q9	-1.59	31.765	361.8	0.98	15.0	5.0

STATION : L102 DATE : 14/09/91 TIME : 1432(Z-6)
DEPTH : 54m
LATITUDE : 69 25.9 N LONGITUDE : 138 00.9 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q10	1.56	14.716	393.1	0.28	27.8	2.3
5	Q11	0.43	17.284	389.3	0.39	21.2	1.7
10	Q12	-1.34	27.576	403.5	0.59	5.2	1.4
20	Q13	-1.45	31.057	388.5	0.82	10.5	2.5
30	Q14	-1.56	31.575	376.3	0.89	12.3	3.6
50	Q15	-1.56	32.263	326.8	1.22	22.4	8.5

STATION : L103 DATE : 14/09/91 TIME : 1552(Z-6)
DEPTH : 87m
LATITUDE : 69 31.4 N LONGITUDE : 138 05.7 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q16	0.57	16.406	402.9	0.19	18.4	0.3
5	Q17	-0.65	23.345	397.0	0.52	8.3	0.2
10	Q18	-1.25	27.527	393.2	0.55	5.1	0.1
20	Q19	-1.32	30.784	418.7	0.66	3.9	0.0
30	Q20	-1.19	31.420	404.7	0.74	5.5	0.8
50	Q21	-1.60	31.963	352.8	1.02	17.2	6.1
75	Q22	-1.43	32.865	303.2	1.51	30.0	12.8

STATION : L104 DATE : 14/09/91 TIME : 1756(Z-6)
DEPTH : 131m
LATITUDE : 69 37.8 N LONGITUDE : 138 14.2 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q23	1.07	13.636	403.7	0.17	24.9	1.0
5	Q24	-0.45	21.447	395.2	0.38	12.1	0.3
10	Q25	-0.44	27.738	379.8	0.62	8.9	0.9
20	Q26	-1.25	30.999	419.4	0.71	4.8	0.2
30	Q27	-1.44	31.441	408.0	0.76	6.5	0.9
50	Q28	-1.53	31.743	389.6	0.85	8.3	2.4
75	Q29	-1.46	32.020	352.7	1.10	16.6	6.1
100	Q30	-1.44	33.057	310.0	1.48	30.2	12.7
125	Q31	-1.39	33.484	302.6	1.47	32.8	13.7

STATION : L122 DATE : 15/09/91 TIME : 2142(Z-6)
DEPTH : 180m
LATITUDE : 69 48.3 N LONGITUDE : 138 24.1 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q32	0.53	15.459	399.0	0.13	20.6	0.4
5	Q33	0.40	15.374	400.2	0.13	20.7	0.3
10	Q34	-0.90	23.840	384.0	0.38	9.6	0.2
20	Q35	-1.12	30.708	403.3	0.67	5.3	0.5
30	Q36	-1.29	31.468	410.2	0.69	4.5	0.3
55	Q37	-1.54	31.883	370.0	0.98	12.0	4.5
75	Q38	-1.44	31.855	377.9	0.95	11.0	4.0
100	Q39	-1.49	32.760	296.7	1.69	30.1	13.9
125	Q40	-1.47	33.037	314.5	1.52	29.9	12.5
150	Q41	-1.39	33.380	311.3	1.57	32.0	13.5

STATION : L123 DATE : 16/09/91 TIME : 1400(Z-6)
DEPTH : 261m
LATITUDE : 69 58.3 N LONGITUDE : 138 34.0 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q42	0.17	16.048	399.6	0.11	16.0	0.2
5	Q43	0.11	15.798	401.0	0.10	16.4	0.2
10	Q44	-0.09	15.581	400.3	0.09	17.2	0.2
20	Q45	-1.19	29.948	397.6	0.62	4.9	0.4
30	Q46	-1.05	30.931	404.6	0.53	7.7	0.2
50	Q47	-1.55	31.819	376.5	0.87	10.7	3.7
75	Q48	-1.51	32.387	319.2	1.36	23.6	10.1
100	Q49	-1.49	32.741	297.7	1.60	28.9	13.6
125	Q50	-1.51	33.059	291.9	1.66	32.3	14.9
150	Q51	-1.40	33.443	308.2	1.52	31.0	13.8
200	Q52	-0.88	34.076	275.4	1.28	25.8	14.9
250	Q53	-0.12	34.612	275.7	0.90	15.2	13.6

STATION : AM1 DATE : 17/09/91 TIME : 0915(Z-6)
CAST : 1 DEPTH : 718m
LATITUDE : 70 32.1 N LONGITUDE : 139 58.3 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q54	-0.78	26.973	386.0	0.67	7.3	0.5
5	Q55	-0.78	27.051	384.6	0.72	7.3	0.4
10	Q56	-0.83	27.507	399.9	0.70	7.0	0.4
20	Q57	-1.54	29.747	419.4	0.76	5.2	0.0
30	Q58	-1.53	30.499	419.6	0.80	5.3	0.3
50	Q59	-1.62	31.600	399.2	0.92	7.1	2.0
75	Q60	-1.44	32.149	341.7	1.44	17.0	6.7
100	Q61	-1.32	32.512	324.0	1.48	21.9	9.7
125	Q62	-1.48	32.697	314.4	1.57	25.5	11.5
150	Q63	-1.51	32.933	287.1	1.82	32.0	15.0

STATION : AM1 DATE : 17/09/91 TIME : 1857(Z-6)
CAST : 2 DEPTH : 1125m
LATITUDE : 70 36.7 N LONGITUDE : 140 03.5 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
200	Q64	-1.19	33.613	285.6	1.66	31.9	14.9
250	Q65	-0.57	34.361	266.9	1.23	20.6	14.4
300	Q66	-0.09	34.638	277.6	0.98	13.5	13.2
350	Q67	0.18	34.732	285.6	0.92	10.7	13.0
400	Q68	0.32	34.776	291.8	0.88	9.1	12.7
450	Q69	0.39	34.807	293.9	0.86	8.4	12.7
500	Q70	0.40	34.821	295.7		8.2	12.8
550	Q71	0.40	34.836	296.2	0.86	7.8	12.8
600	Q72	0.41	34.851	296.9	0.88	8.2	12.8
750	Q73	0.33	34.793	299.0	0.89	8.1	12.8

STATION : ALS–4 DATE : 25/09/91 TIME : 0038(Z–6)
CAST : 1 DEPTH : 760m
LATITUDE : 70 34.3 N LONGITUDE : 140 01.3 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
0	Q114	0.14	15.082	408.8	0.14	17.2	0.0
5	Q115	0.03	15.642	405.8	0.24	16.9	0.0
10	Q116	–0.32	23.102	393.6	0.52	11.2	0.5
20	Q117	–1.35	28.986	400.1	0.75	4.7	0.3
30	Q118	–1.34	30.269	413.3	0.81	4.4	–0.0
50	Q119	–1.58	31.562	404.7	0.95	7.2	1.6
75	Q120	–1.50	32.056	357.6	1.31	14.6	6.3
100	Q121	–1.43	32.545	317.3	1.59	24.9	11.3
125	Q122	–1.48	32.788	311.0	1.67	27.9	12.7
150	Q123	–1.51	33.047	305.1	1.75	31.3	14.1

STATION : ALS-4 DATE : 25/09/91 TIME : 1257(Z-6)
CAST : 2 DEPTH : 780m
LATITUDE : 70 33.8 N LONGITUDE : 139 57.9 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
200	Q124	-1.31	33.696	314.9	1.62	32.4	13.4
250	Q125	-0.47	34.436	271.8	1.19	19.3	14.1
300	Q126	-0.07	34.651	281.8	1.02	13.7	13.3
350	Q127	0.20	34.724	289.7	0.96	11.1	13.1
400	Q128	0.35	34.783	296.2	0.91	8.9	12.9
450	Q129	0.39	34.807	298.1	0.91	8.6	12.9
500	Q130	0.39	34.851	299.6	0.91	8.3	13.1
550	Q131	0.41	34.828	300.3	0.91	8.1	13.0
600	Q132	0.40	34.848	300.2	0.90	8.2	13.1
700	Q133	0.35	34.863	301.7	0.91	7.8	13.1

STATION : L144 DATE : 19/01/91 TIME : 1917(Z-6)
CAST : 1 DEPTH : 2650m (* see note)
LATITUDE : 71 26.5 N LONGITUDE : 141 24.0 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
1000	Q74	0.09	34.894	308.6	0.93	8.0	12.7
1250	Q75	-0.15	34.894	307.7	0.93	8.4	13.1
1500	Q76	-0.30	34.920	306.2	0.96	9.2	13.5
1600	Q77	-0.35	34.921	304.4	0.99	10.2	13.6
1700	Q78	-0.39	34.932	301.9	1.01	10.7	13.8
1800	Q79	-0.40	34.936	299.7	1.02	11.1	14.1
1900	Q80	-0.41	34.940	297.5	1.05	11.9	14.3
2000	Q81	-0.41	34.942	296.1	1.06	12.6	14.5
2250	Q82	-0.40		293.5	1.09	13.5	14.6
2500	Q83	-0.38	34.954	290.2	1.08	14.4	14.8

* note : The 2650m depth recorded was obtained by lowering a pressure sensor to the bottom on September 20/92 (2030). The range of depths recorded at station L144 from September 19/92 to September 22/92 was 2575m to 2715m.

STATION : L144 DATE : 20/09/91 TIME : 1940(Z-6)
CAST : 3 DEPTH : 2650m (* see note)
LATITUDE : 71 19.0 N LONGITUDE : 141 27.1 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
160	Q94	-1.32	33.161	295.4	1.79	34.7	14.8
170	Q95	-1.41	33.288	309.3	1.71	32.9	13.4
180	Q96	-1.40	33.431	293.8	1.73	33.2	14.7
190	Q97	-1.40	33.617	305.7	1.69	33.0	13.8
200	Q98	-1.33	33.781	303.1	1.64	31.9	14.1
225	Q99	-0.69	34.228	270.7	1.37	23.6	14.6
250	Q100	-0.38	34.483	272.1	1.16	18.3	13.7
275	Q101	-0.19	34.590	276.1	1.06	15.7	13.3
300	Q102	-0.03	34.657	279.8	1.02	13.6	13.1
325	Q103	0.11	34.706	285.5	1.00	12.3	13.0

* note : The 2650m depth recorded was obtained by lowering a pressure sensor to the bottom on September 20/92 (2030). The range of depths recorded at station L144 from September 19/92 to September 22/92 was 2575m to 2715m.

STATION : L144 DATE : 20/09/91 TIME : 0929(Z-6)
CAST : 2 DEPTH : 2650m (* see note)
LATITUDE : 71 19.4 N LONGITUDE : 141 24.3 W

DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3
350	Q84	0.19	34.740	287.1	1.00	11.1	12.9
375	Q85	0.25	34.753	289.9	0.97	10.4	12.8
400	Q86	0.32	34.773	292.6	1.03	9.3	12.7
450	Q87	0.38	34.801	295.4	1.00	8.7	12.6
500	Q88	0.39	34.821	295.7	0.92	8.3	12.7
550	Q89	0.39	34.808	295.7	0.91	8.0	12.8
600	Q90	0.40	34.845	297.7	0.91	8.1	12.7
700	Q91	0.36	34.862	300.2	0.91	7.8	12.8
800	Q92	0.29	34.872	300.6	0.91	7.7	12.9
900	Q93	0.19		306.8	0.91	7.6	12.9

* note : The 2650m depth recorded was obtained by lowering a pressure sensor to the bottom on September 20/92 (2030). The range of depths recorded at station L144 from September 19/92 to September 22/92 was 2575m to 2715m.

STATION : L144 DATE : 22/09/91 TIME : 0915(Z-6)
CAST : 4 DEPTH : 2650m (* see note)
LATITUDE : 71 23.5 N LONGITUDE : 141 42.3 W

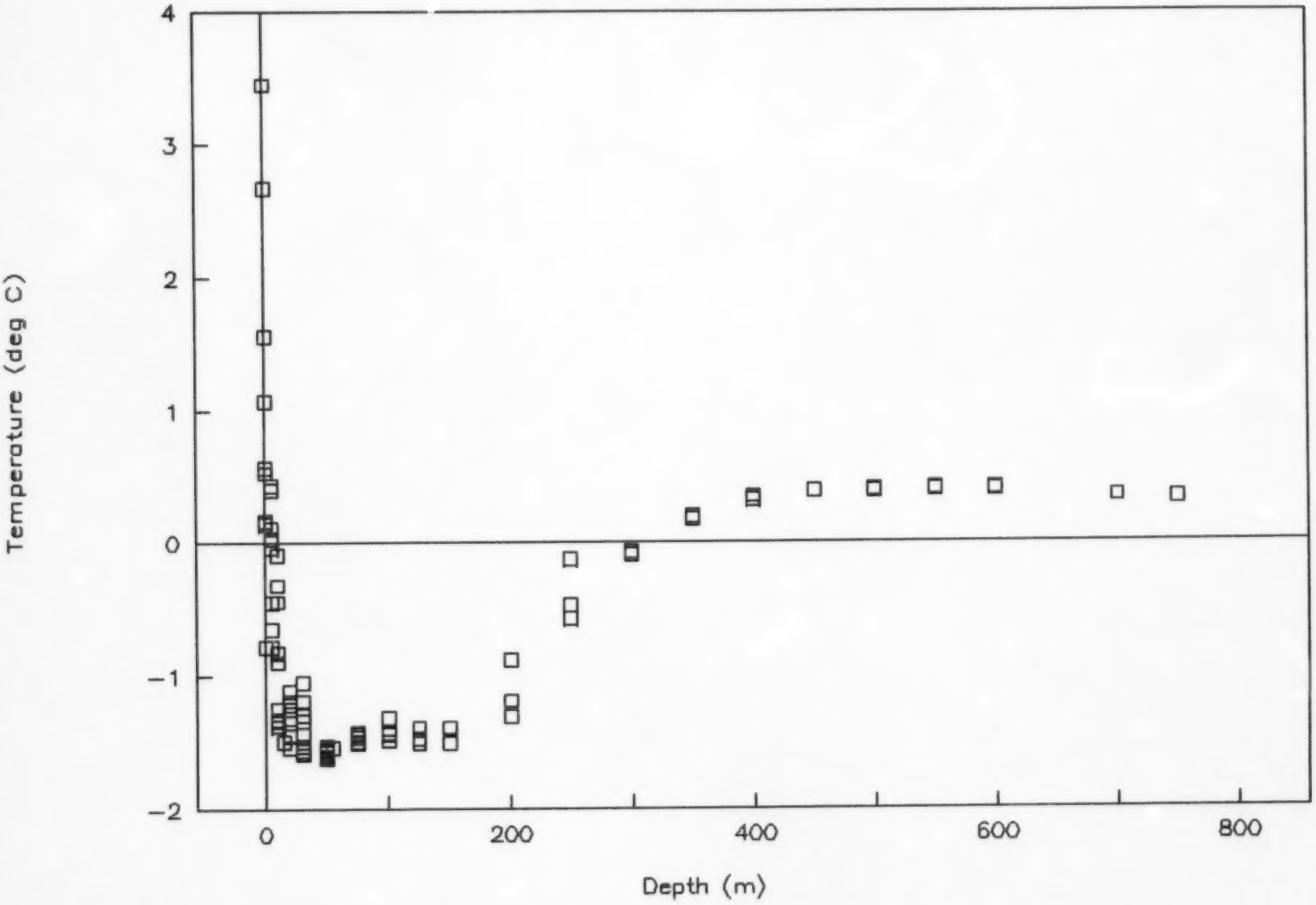
DEPTH m	SAMPLE #	TEMP Deg C	SALINITY psu	OXYGEN mmol/m^3	PHOSHATE mmol/m^3	SILICATE mmol/m^3	NITRATE mmol/m^3	CHLA mg/m^3	PHAEO mg/m^3
0	Q104	-1.17	19.488	414.2	0.36	10.7	0.1	0.54	0.85
5	Q105	-1.10	19.941	415.4	0.36	10.2	0.0	0.74	0.91
10	Q106	-1.48	27.824	420.7	0.67	5.5	0.0	0.44	0.26
20	Q107	-1.61	29.553	417.1	0.74	5.0	0.0	0.36	0.11
30	Q108	-1.58	29.766	417.6	0.75	4.9	0.0	0.24	0.13
50	Q109	-1.51	31.399	414.9	0.84	6.4	0.5	0.19	0.19
75	Q110	-1.60	31.654	395.4	0.97	8.6	2.6	0.08	0.11
100	Q111	-1.42	32.346	326.6	1.54	21.0	10.0	0.04	0.03
125	Q112	-1.44	32.723	314.4	1.68	25.6	12.1	0.02	0.03
150	Q113	-1.25	32.981	331.2	1.59	27.5	11.1	0.03	0.03

* note : The 2650m depth recorded was obtained by lowering a pressure sensor to the bottom on September 20/92 (2030). The range of depths recorded at station L144 from September 19/92 to September 22/92 was 2575m to 2715m.

6 APPENDIX 3; SCATTER PLOTS FOR CHEMICAL DATA

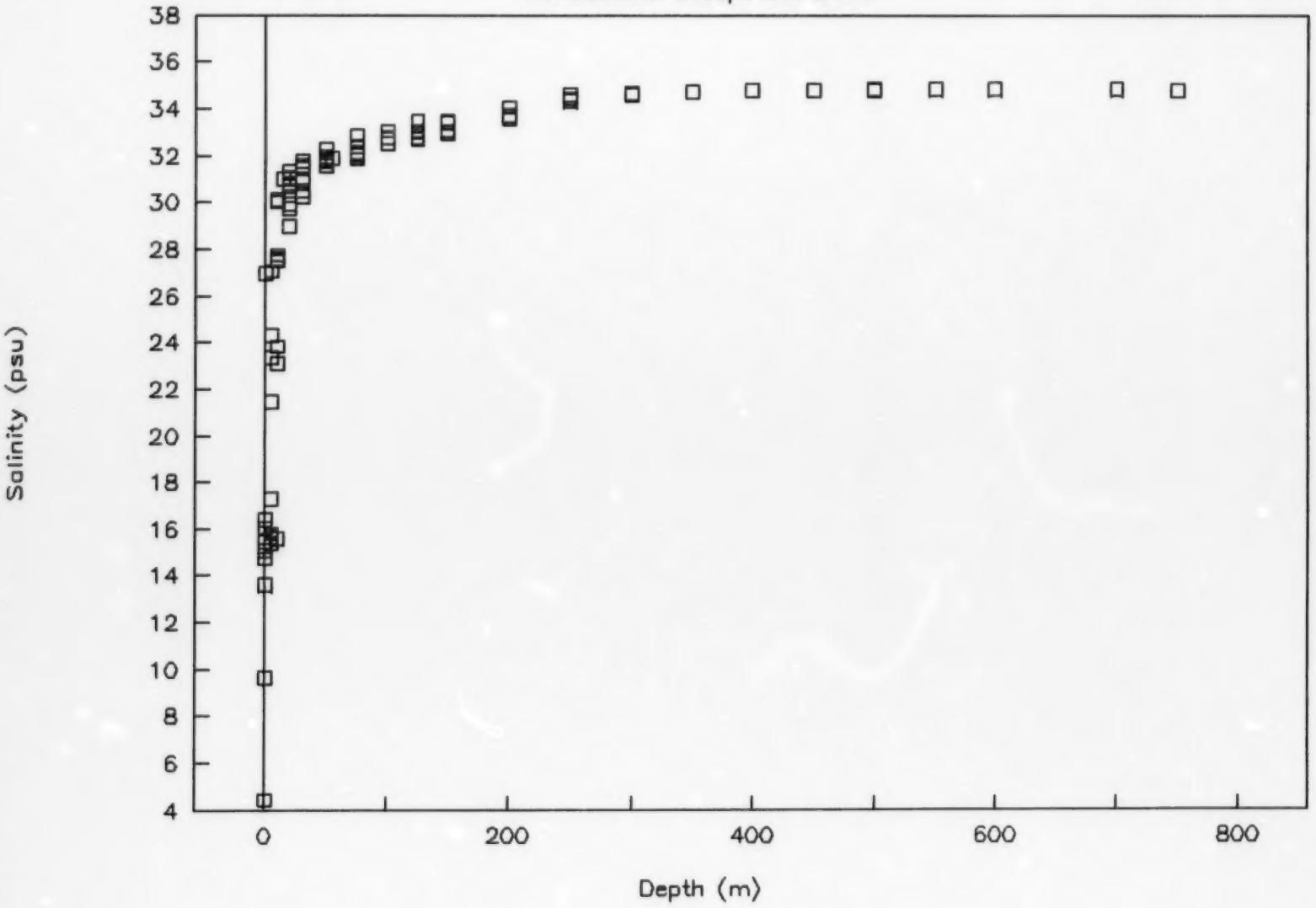
CRUISE 9170

All stations except Stn L144



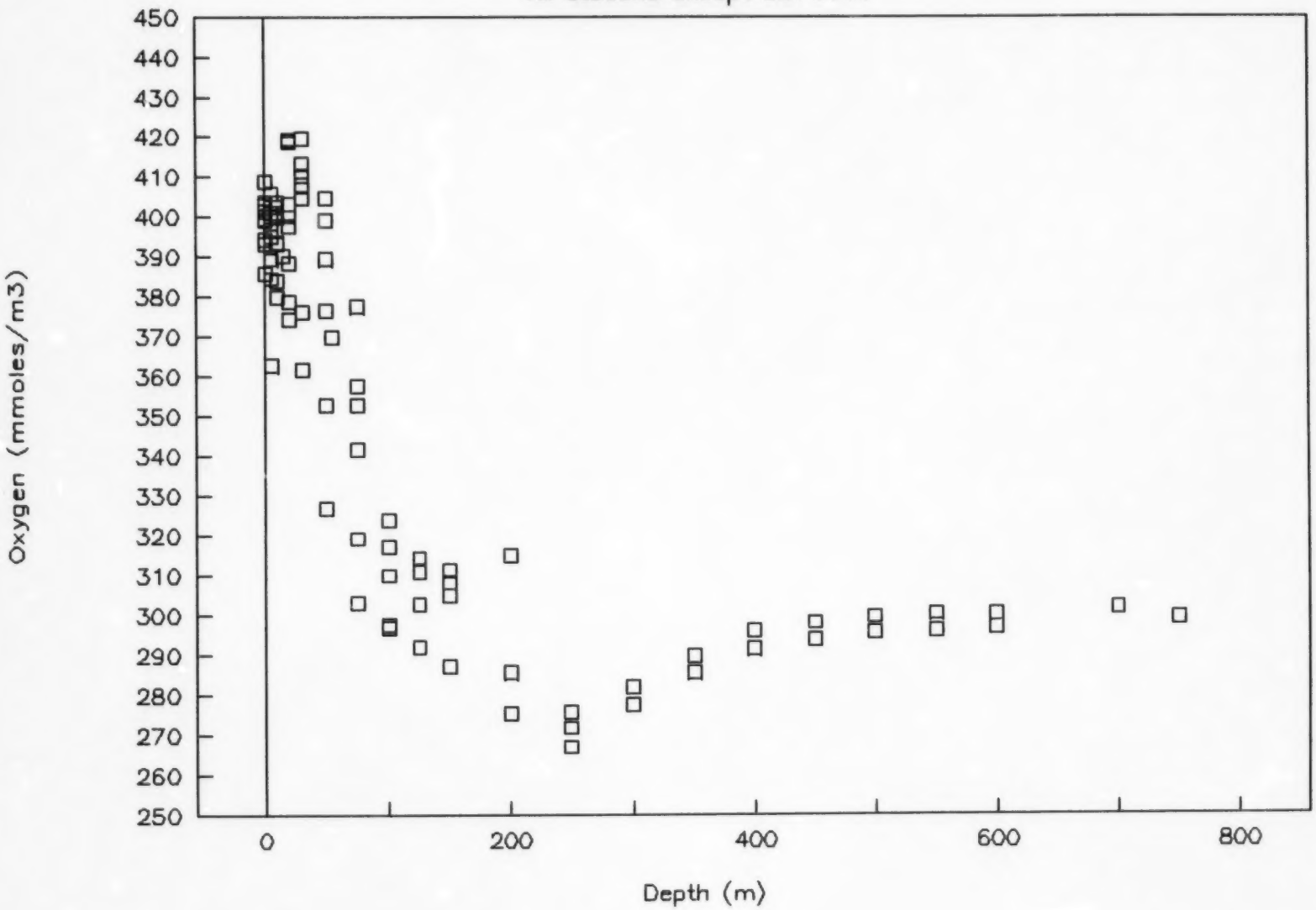
CRUISE 9170

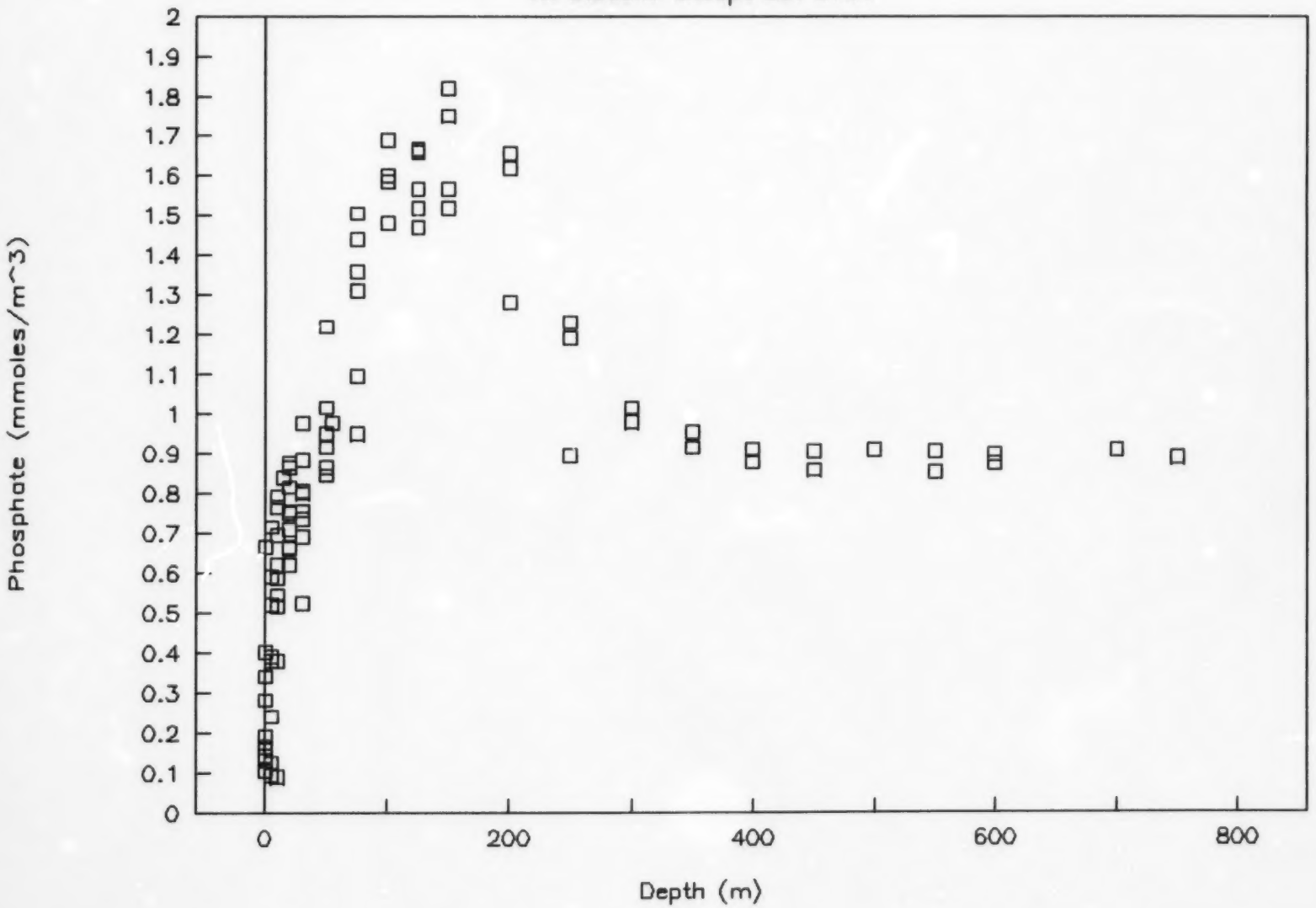
All stations except Stn L144



CRUISE 9170

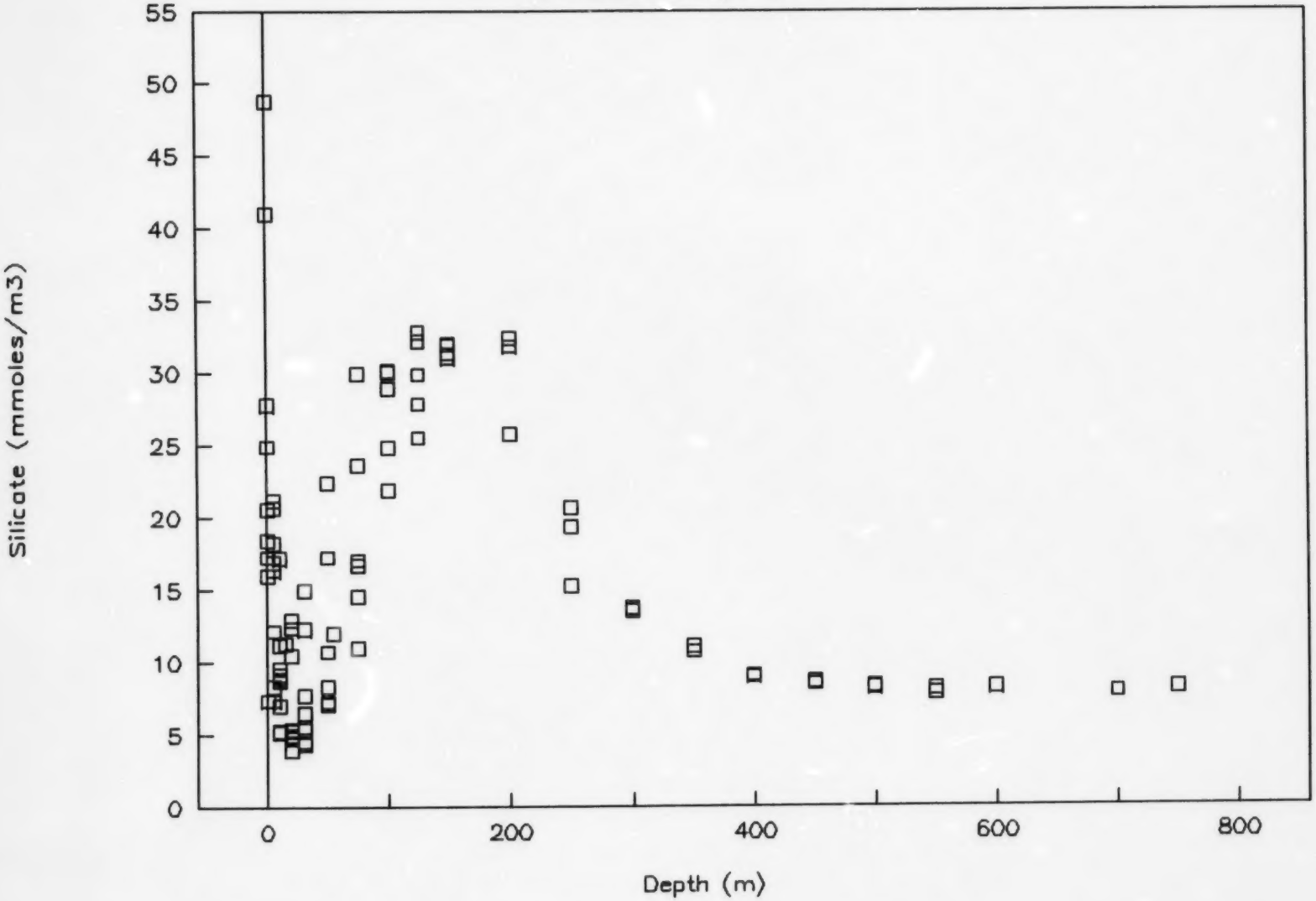
All stations except Stn L144




CRUISE 9170
All stations except Stn L144
Phosphate (mmoles/m^3)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
200
400
600
800
Depth (m)

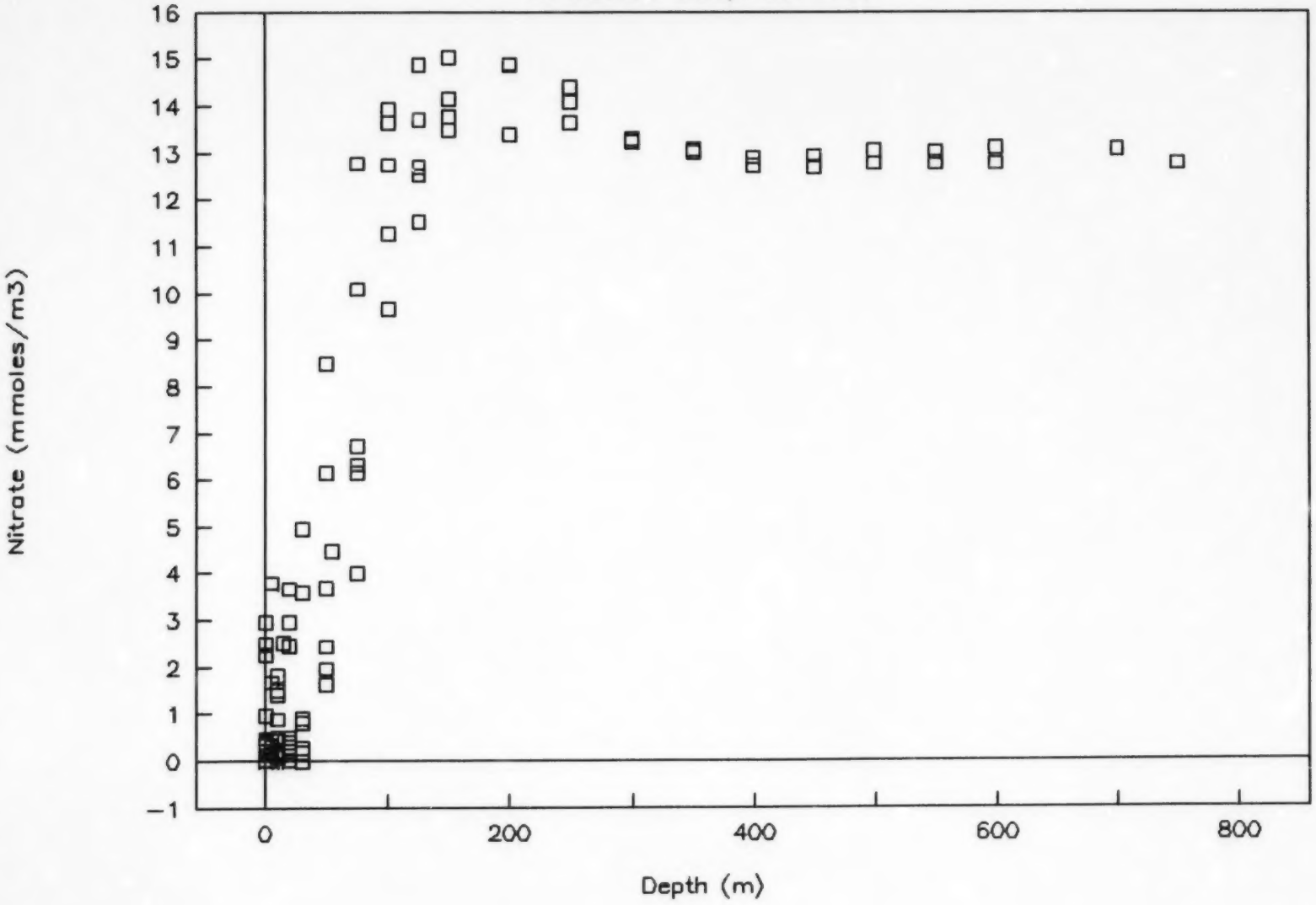
CRUISE 9170

All stations except Stn L144



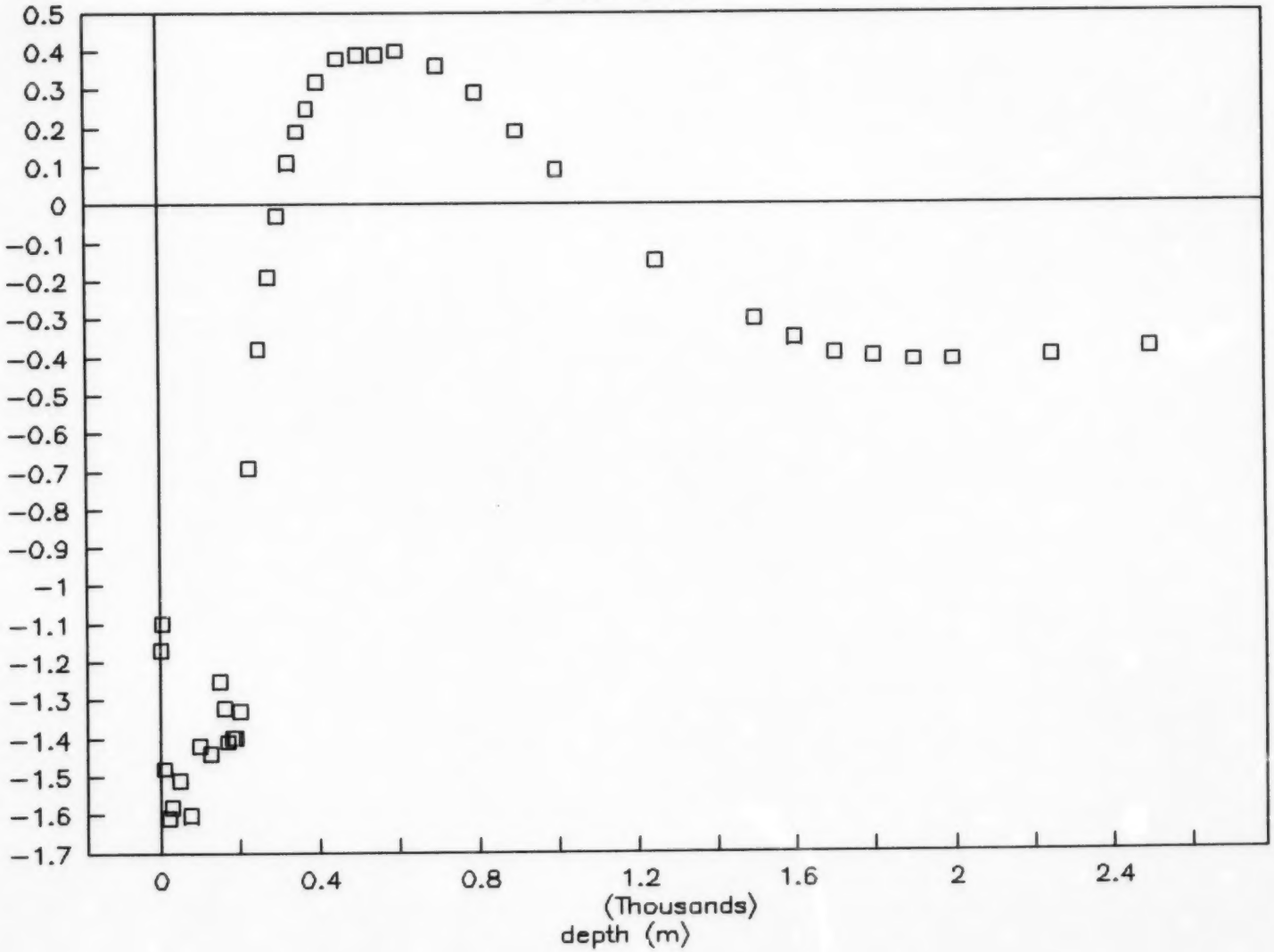
CRUISE 9170

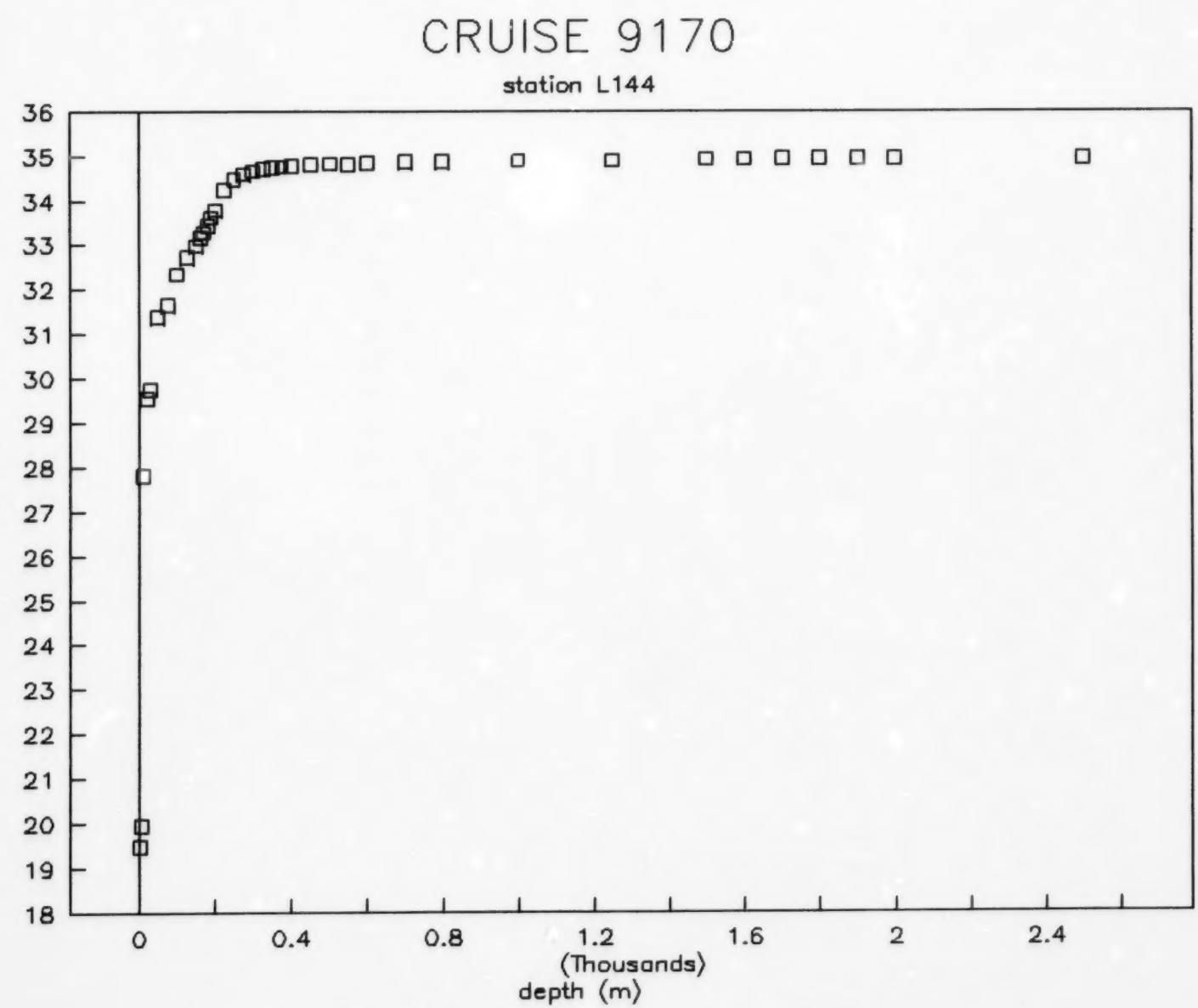
All stations except Stn L144



CRUISE 9170

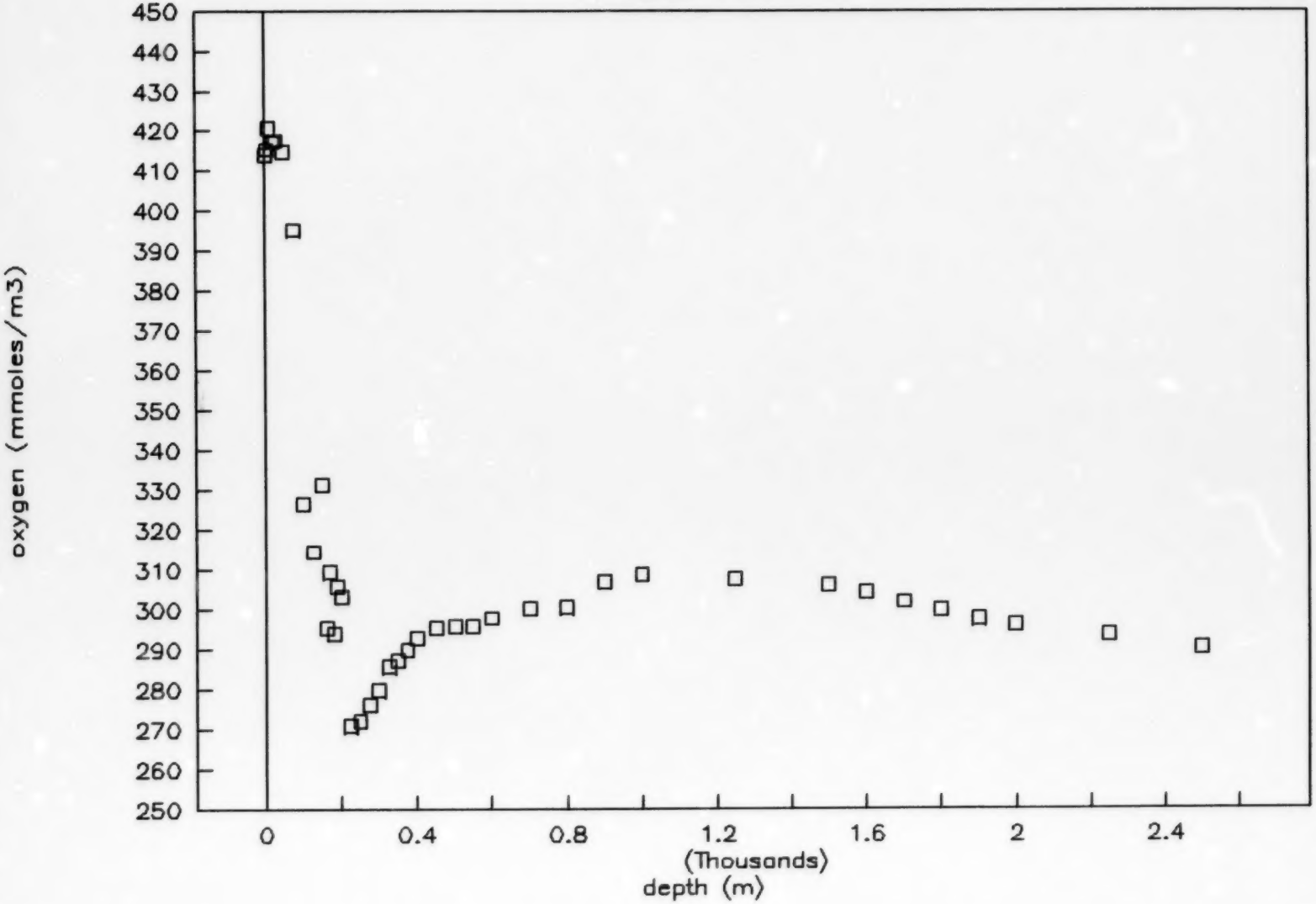
Station L144

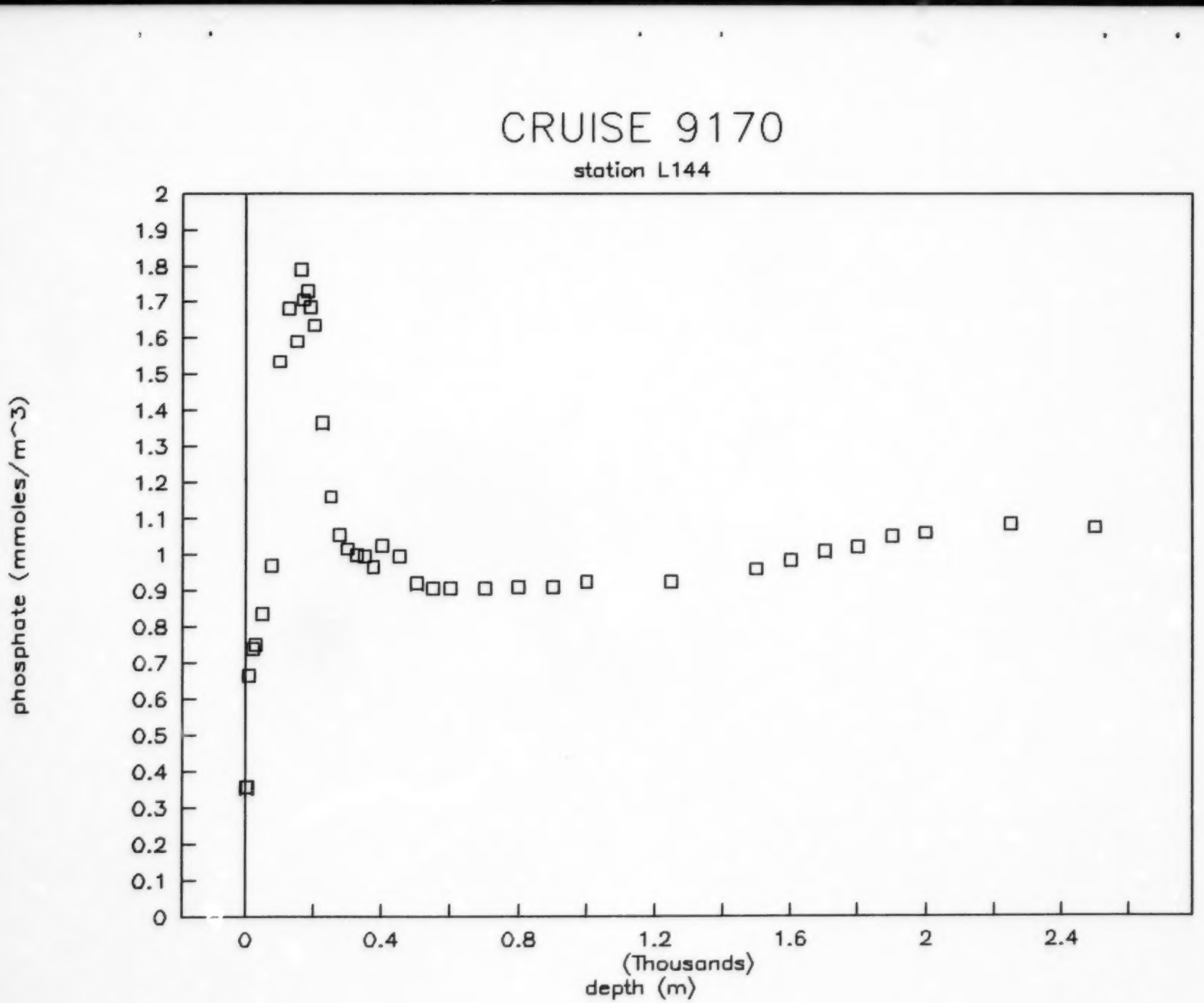


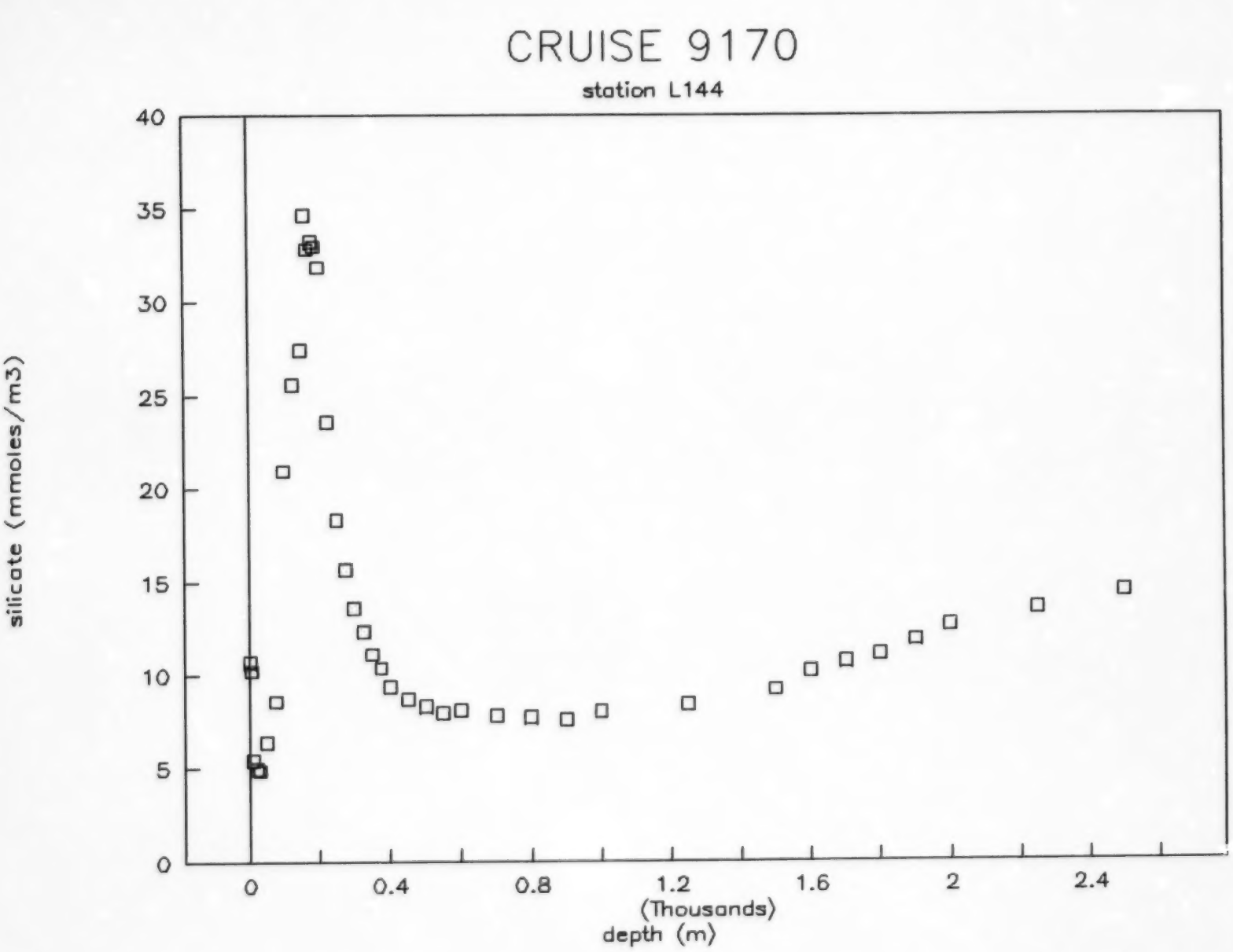

CRUISE 9170
station L144
salinity (psu)
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
0
0.4
0.8
1.2
1.6
2
2.4
(Thousands)
depth (m)

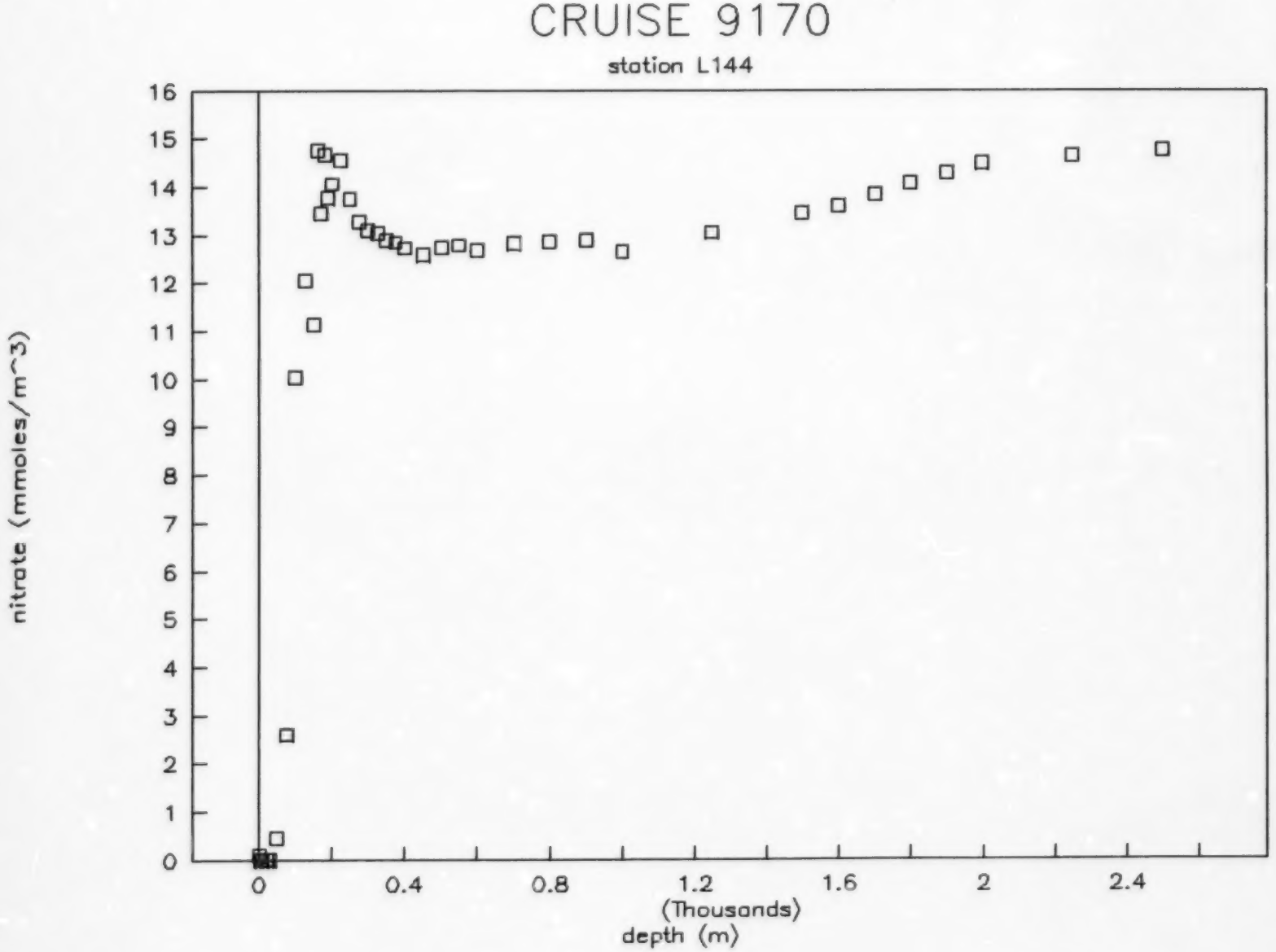
CRUISE 9170

station L144



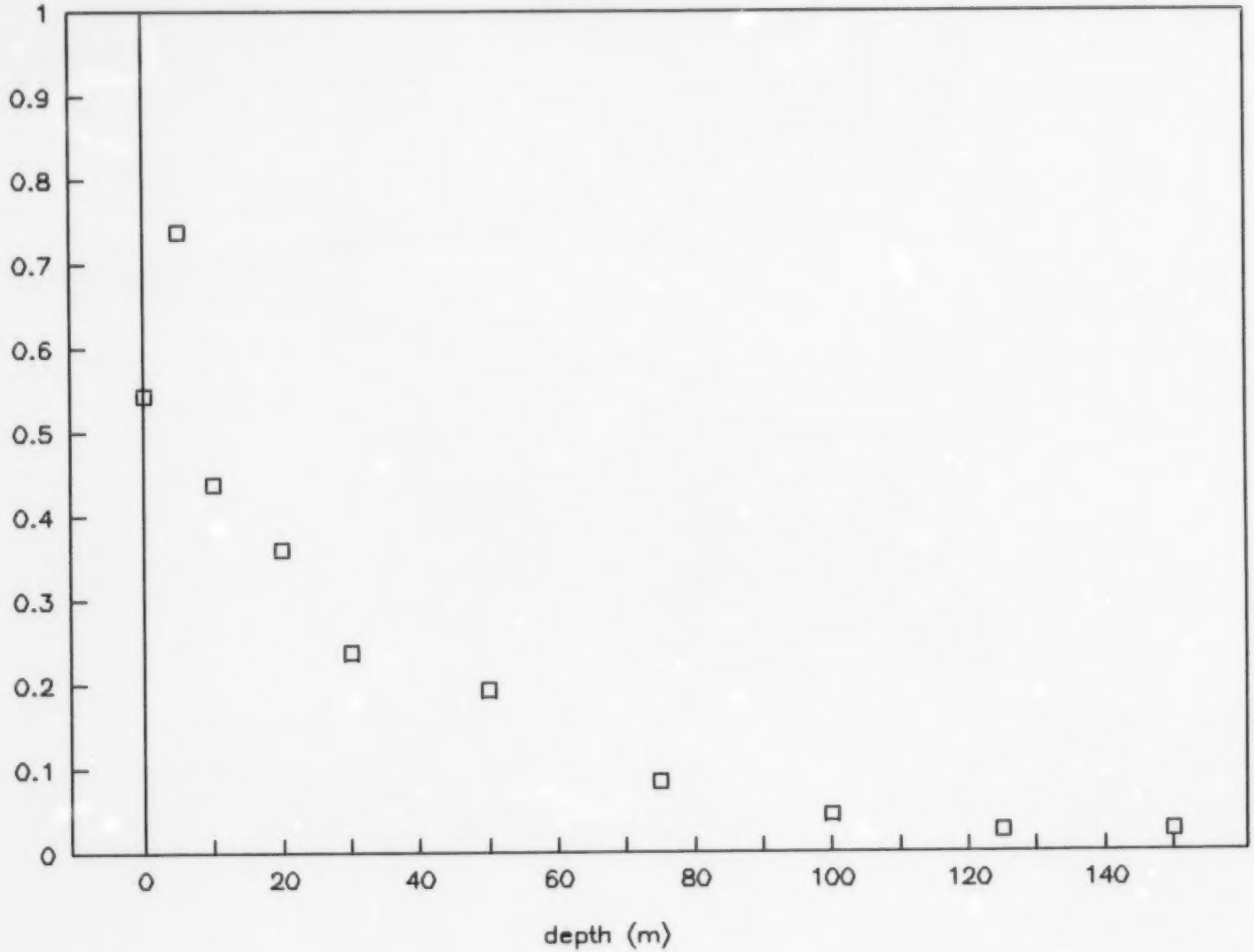

CRUISE 9170
station L144
phosphate (mmoles/m^3)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.4
0.8
1.2
1.6
2
2.4
(Thousands)
depth (m)

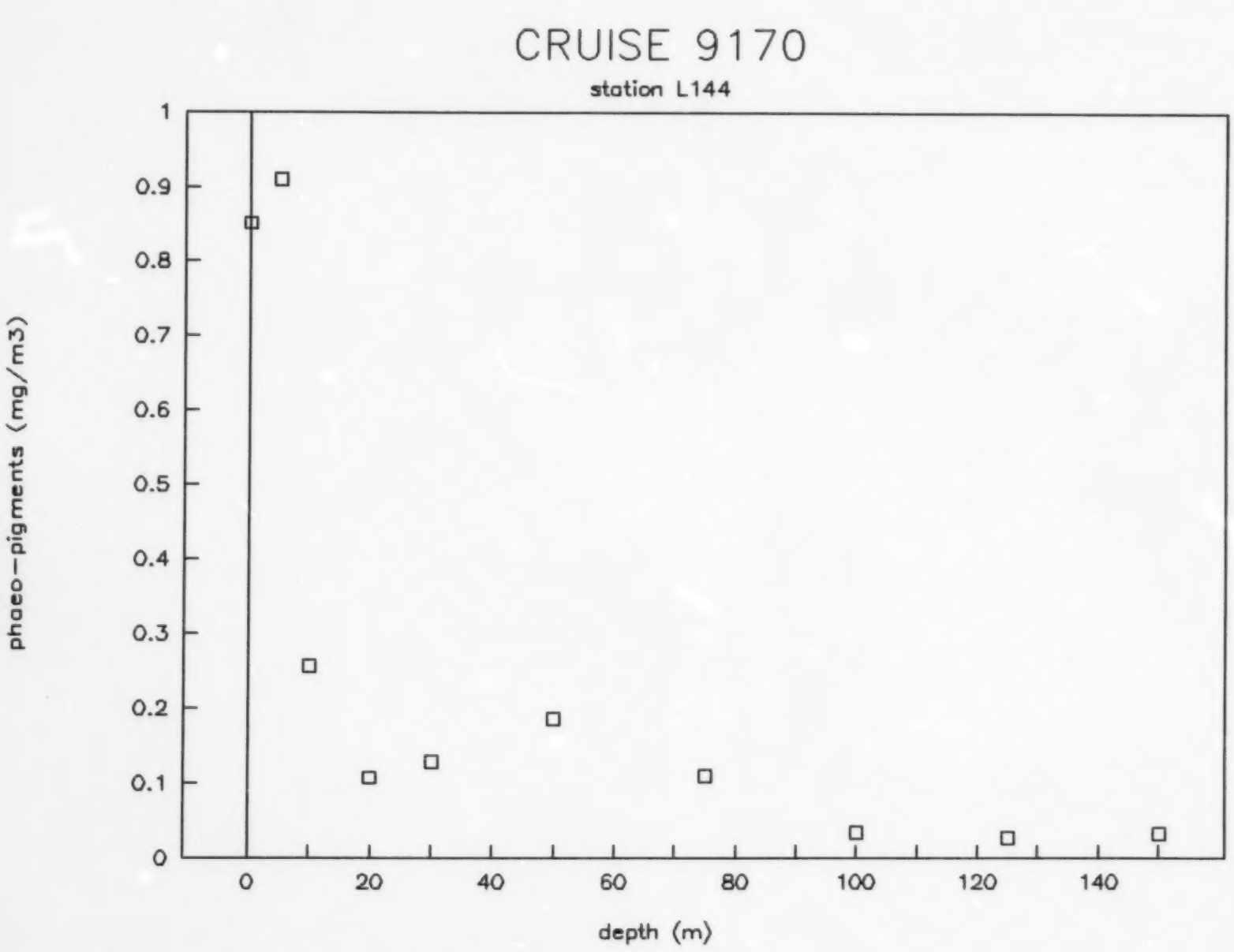

CRUISE 9170
station L144
silicate (mmoles/m3)
40
35
30
25
20
15
10
5
0
0
0.4
0.8
1.2
1.6
2
2.4
(Thousands)
depth (m)

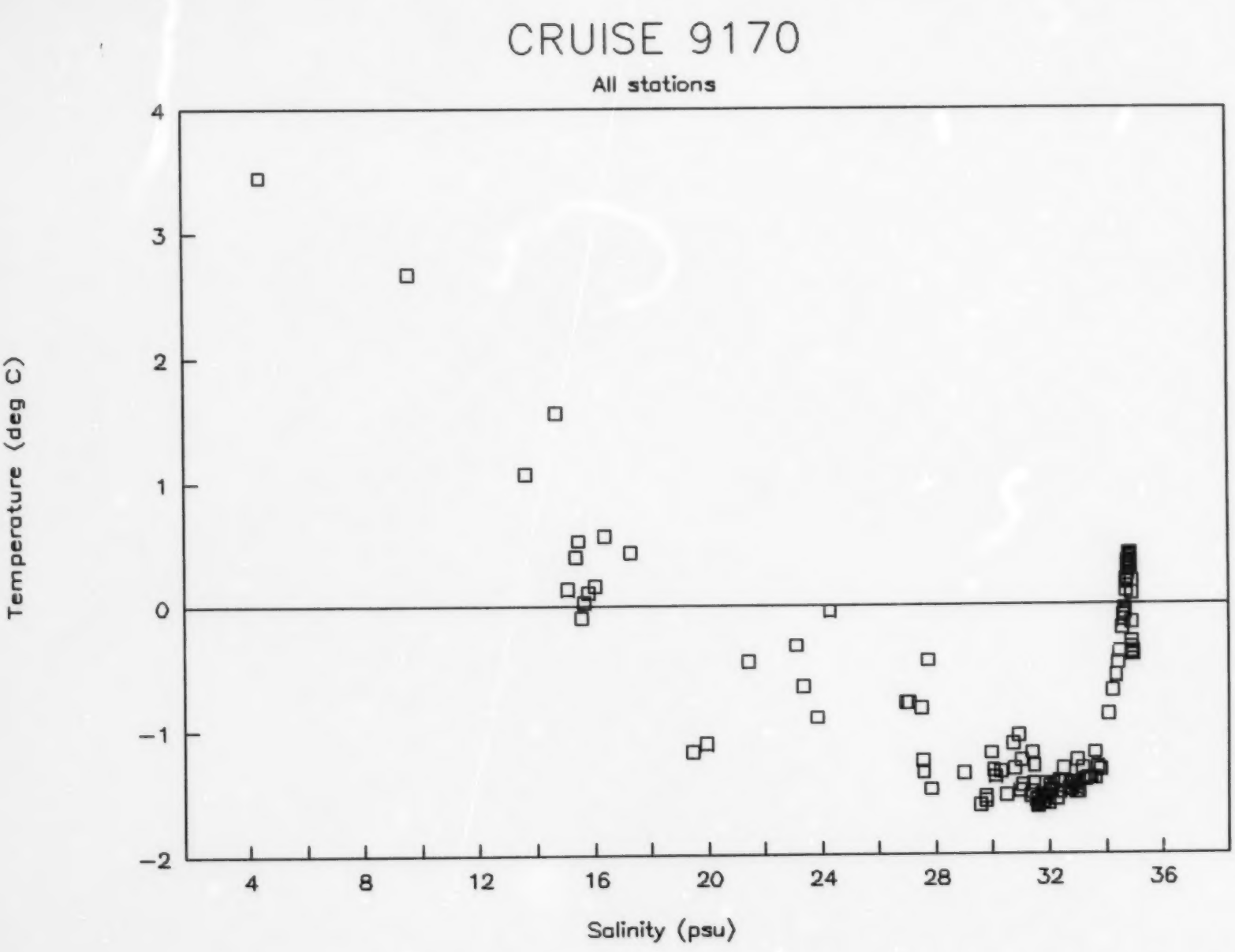

CRUISE 9170
station L144
nitrate (mmoles/m^3)
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
0
0.4
0.8
1.2
1.6
2
2.4
(Thousands)
depth (m)

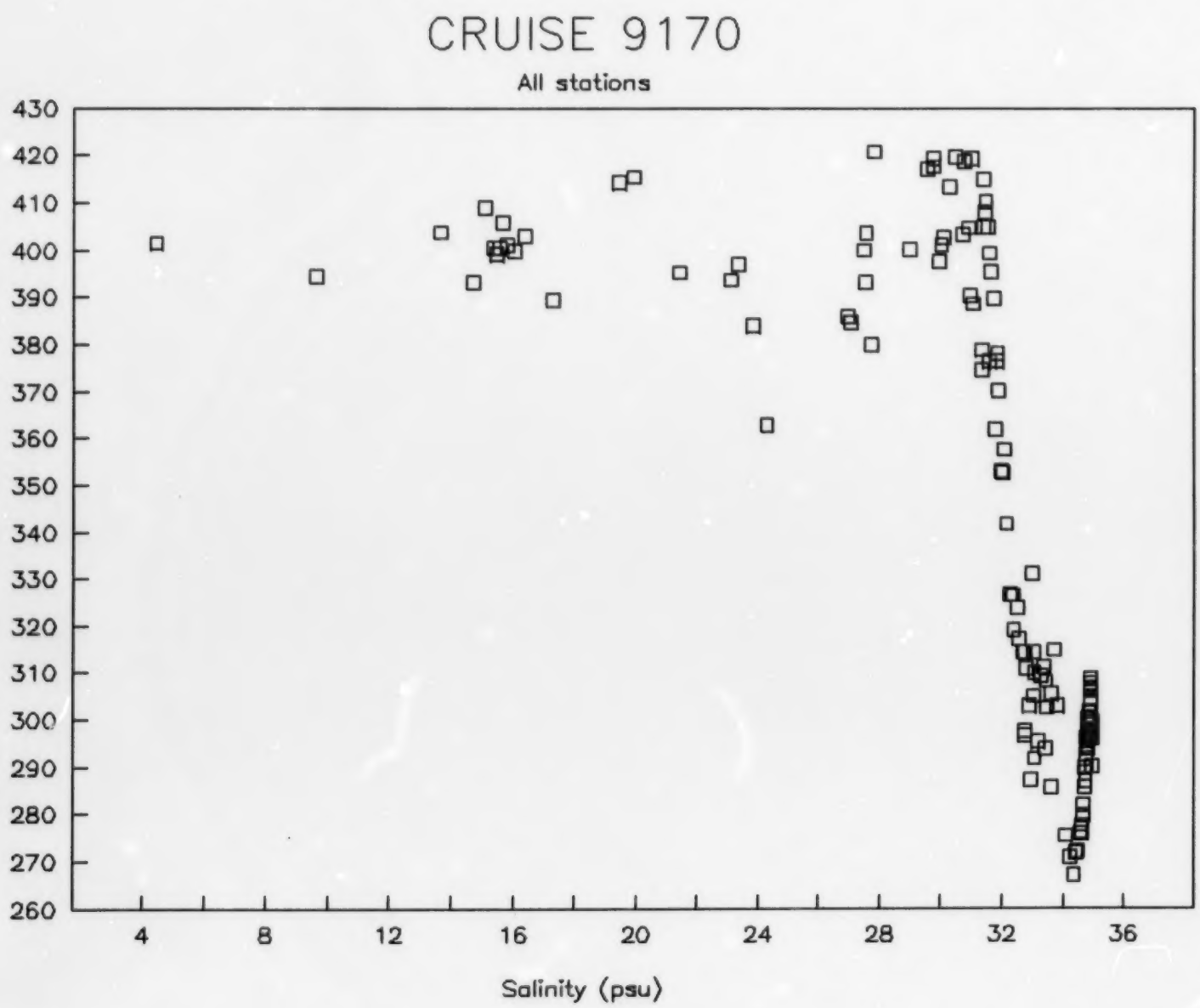
CRUISE 9170

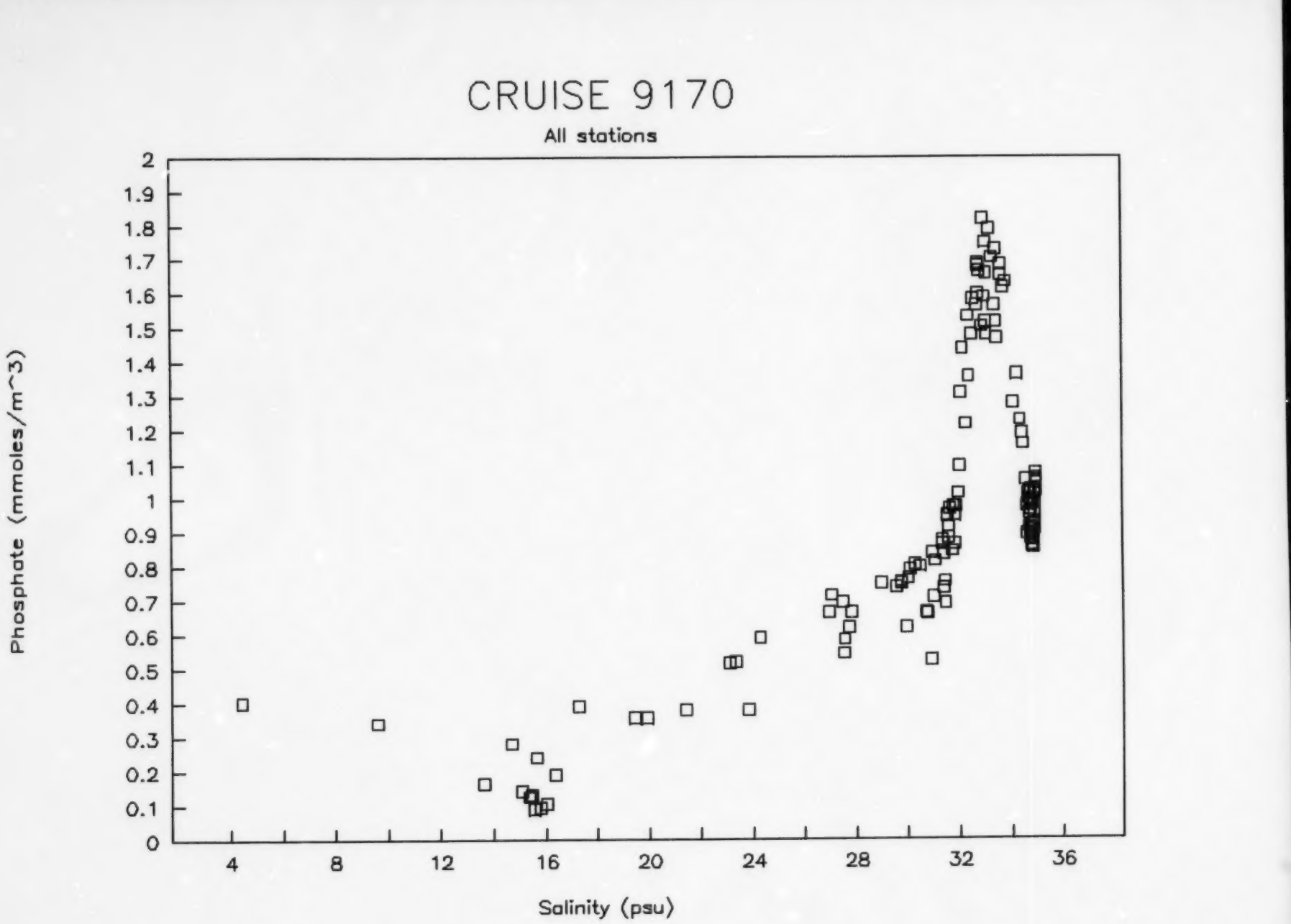
station L144

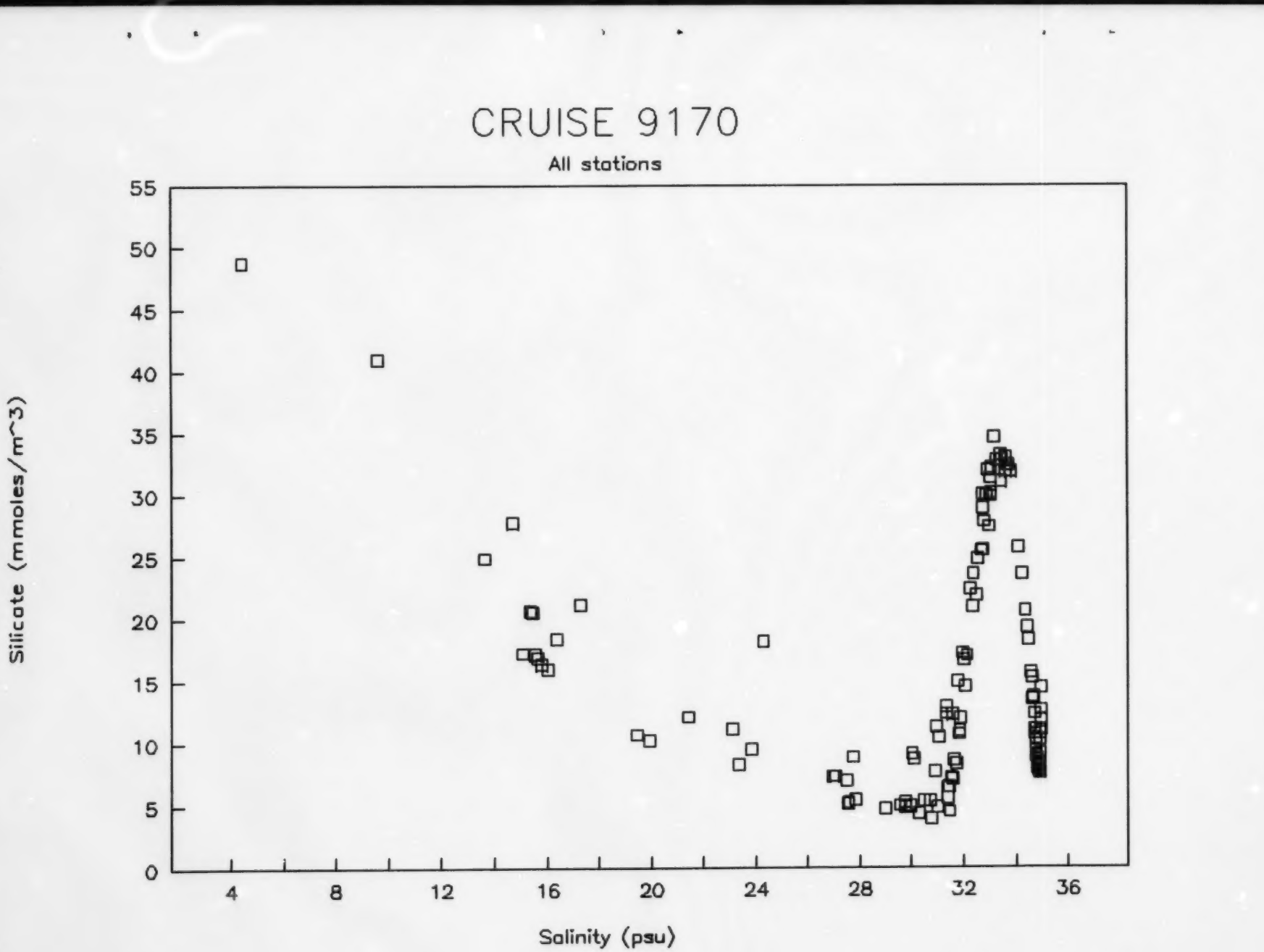



CRUISE 9170
station L144
phaeo-pigments (mg/m3)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
20
40
60
80
100
120
140
depth (m)


CRUISE 9170
All stations
Temperature (deg C)
4
3
2
1
0
−1
−2
4
8
12
16
20
24
28
32
36
Salinity (psu)

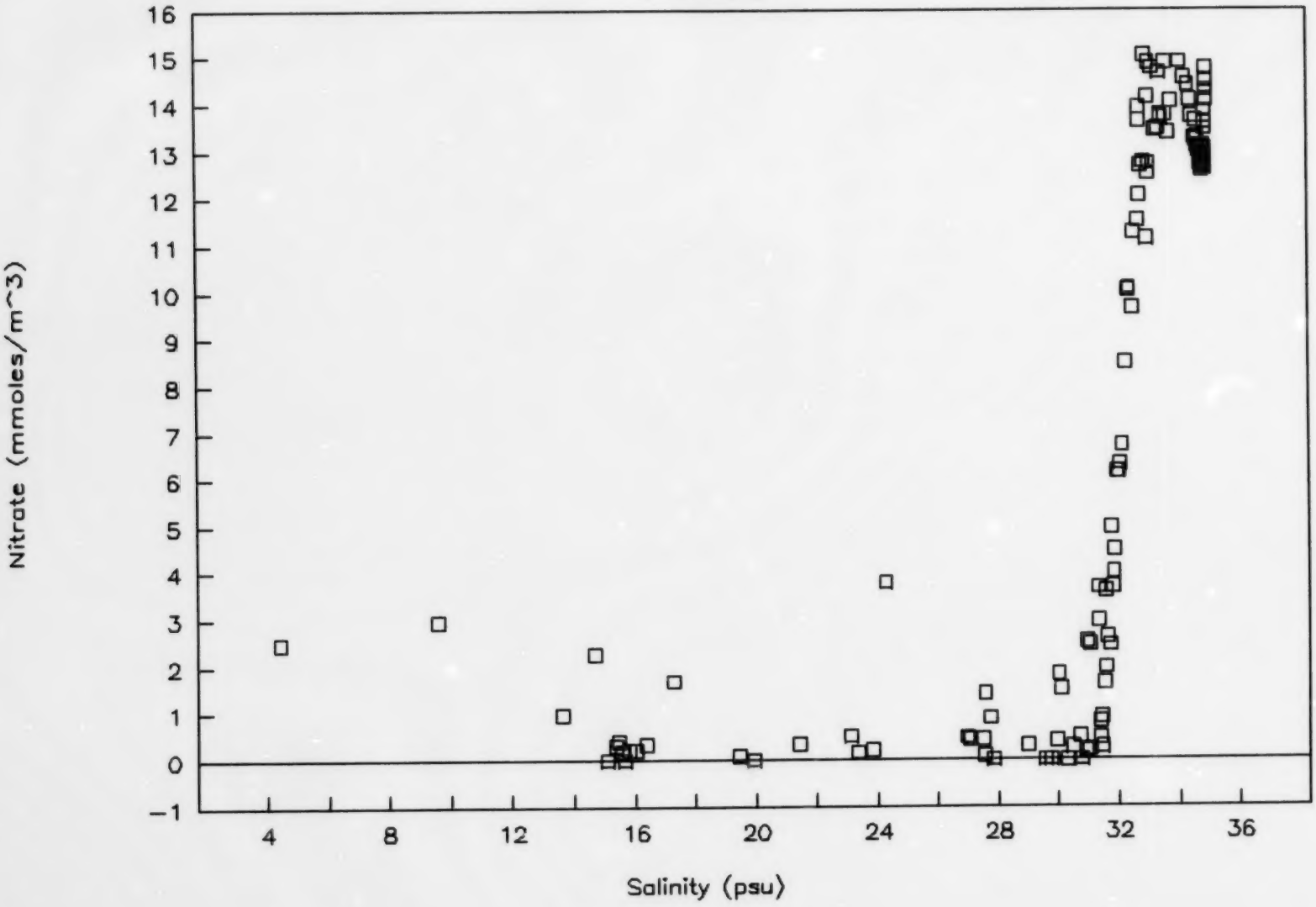

CRUISE 9170
All stations
Oxygen (mmoles/m3)
430
420
410
400
390
380
370
360
350
340
330
320
310
300
290
280
270
260
4
8
12
16
20
24
28
32
36
Salinity (psu)


CRUISE 9170
All stations
Phosphate (mmoles/m^3)
Salinity (psu)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
4
8
12
16
20
24
28
32
36


CRUISE 9170
All stations
Silicate (mmoles/m^3)
Salinity (psu)
0
5
10
15
20
25
30
35
40
45
50
55
4
8
12
16
20
24
28
32
36

CRUISE 9170

All stations



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